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An Index of
**EQUINE
RESEARCH
1972**



An Index of Equine Research 1972

by

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UNITED STATES DEPARTMENT OF AGRICULTURE
in cooperation with
American Horse Council, Inc.

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INTRODUCTION

Index of Equine Research 1972 was prepared for the benefit of the equine industry in its growing role as an economic and recreational resource of the United States. It was cooperatively prepared by the U.S. Department of Agriculture and the American Horse Council, Inc. Its purposes are to facilitate communication among scientists who are performing research on problems of horses, ponies, mules and other equines, and to inform administrators and other interested citizens of the scope and intensity of the research.

An earlier "Index of Current Equine Research" was published by the Morris Animal Foundation of Denver, Colorado, in 1965 and 1966. The Index of Equine Research 1972 is the only similar publication since that time. It represents a unique effort. Its relative completeness was significantly aided by the recent availability of automated information retrieval from the Current Research Information System (CRIS) of the United States Department of Agriculture, the Science Information Exchange (SIE) of the Smithsonian Institution, the Division of Research Grants of the National Institutes of Health (NIH), and by the generous cooperation of many administrators in State Universities, Land-Grant Colleges, Foundations, and horse-breed registries. The 1972 Index was reviewed in draft form by the Secretary of Agriculture's National Horse Industry Advisory Committee at its first meeting October 16 and 17, 1972 in Washington, D.C.

How to Use the Index of Equine Research 1972

The Index is a series of brief descriptions of individual research projects and a set of cross-indices. Each project is identified by an accession number. Project descriptions are arranged under the State in which the research is being performed. In the cross-indices, the accession number and State of the projects are grouped in the following categories:

Subject of Research Project
Investigator
Performing Organization
Granting Agency

In addition, there is an index of titles arranged alphabetically by keyword-in-context (KWIC Index). Items of interest may be located in the appropriate cross-index. To find the description of the research project to which a selected item applies, first note the 3-digit accession number next to the item designation. Then refer to the section of The Index of Equine Research entitled "Description of Research Projects." The project descriptions are arranged in numerical order by accession number.

Subject of Research Project index designates the subject-matter categories and specific subjects included in the research projects. Accession

numbers of applicable project descriptions are shown next to the listed subject.

Investigator index gives the name of the first research scientist given in the project document received from those who provided descriptive information.

Performing Organization is the administrative unit which receives and is responsible for the use of the funds provided by a granting agency.

Granting Agency is the administrative unit with authority to release research funds either to a performing organization or to a scientists directly. A foundation acting as a granting agency may have received funds from many private donors. The Agricultural Experiment Station of the respective State is a Granting agency whose funds come from the State, United States Department of Agriculture, other Federal sources, and from private sources.

Research Funds and Manpower

Some quantitative estimates of research effort are presented in the cross-index entitled Subject of Research Project. Funds shown are the totals of all the projects combined under a given Subject category. The individual project total is not shown. Also, the indicated scientist man-years (SMY) engaged in research on a given subject was cumulated from the manpower estimate received with project descriptions. In those instances in which only a fund total was received, SMY was calculated by dividing by a factor of \$94,444 if the project was supported either by a private source or by the Agricultural Research Service (ARS) of the U.S. Department of Agriculture. However, if the project was supported by the State Agricultural Experiment Station SMY was calculated by dividing by a factor of \$40,000. The factors were derived from CRIS summaries of March 1972 which showed 5.6 SMY and \$528,888 expended for equine research in ARS, excepting work at the Plumb Island Laboratory, and 22.8 SMY and \$927,000 similarly expended in the State Agricultural Experiment Stations.

Close examination of totals shown in The Subject Index will reveal more projects are designated than are included in the section entitled "Description of Research Projects." This is due to the inclusion of work on more than one subject in some of the research projects. Funds and scientist man-years were counted separately and are mutually exclusive. Many projects had no record of funds or manpower. For this reason, the actual amounts being expended for equine research are probably greater than those shown.

DESCRIPTION OF RESEARCH PROJECTS

Alabama

Comparison of Pressures and Myography in Intromission

Investigator: S.D. Beckett	Accession Number: 001
Start: June 1971	Location: School of Veterinary Medicine
Terminate: May 1972	Auburn University
	Auburn, Alabama 36830

Objectives and Approach:

The stallion is used as a model to study the mechanism of erection because of similarity in the anatomy of it and man. The corpus cavernosum penis (ccp) pressure has been determined and compared to systemic blood pressure and it was found to be much higher than blood pressure. Simultaneous electromyograms of the ischiocavernosus and bulbocavernosus muscles are being recorded with ccp pressure in order to determine what external penile muscle is the source of energy for the high pressure. Anatomical studies will be undertaken to correlate with the physiological findings. Results will be compared to results from other species of animals also under study.

Pressures and Electromyography Associated with Tumescence and Intromission in the Bull and Stallion

Investigator: S.D. Beckett	Accession Number: 002
Start: July 1969	Location: Auburn University
Terminate: June 1972	Auburn, Alabama 36830

Objectives:

Develop methods for determining corpus cavernosum pressures. Determine role of blood and certain muscles in penile tumescence. Determine mechanism involved in the prevention of corpus cavernosum pressure transmission into the arterial circulatory system.

Approach:

Telemetry systems will be utilized to record corpus cavernosum and arterial pressures during natural state tumescence and quiescence. Role of ischiocavernosus and bulbo-cavernosus muscles will be determined by monitoring the bioelectrical potentials. Results of anatomical studies will be correlated with physiological data to clarify functional mechanisms.

Cardiac Dynamics Following Coronary Insufficiency

Investigator: Walter C. Bowie	Accession Number: 003
Start: September 1, 1964	Location: School of Veterinary Medicine
Terminate: August 31, 1973	Tuskegee Institute
	Tuskegee Institute, Ala. 36088

Objectives and Approach:

Long-term effects of acute regional myocardial ischemia on myocardial mechanics, metabolism and factors which improve coronary retrograde flow into areas of chronic myocardial ischemia remain unknown. Adequate understanding of these effects is important for progress in treating human heart disease. This problem can be explored in a comprehensive fashion in a preparation large enough (i.e., the horse) to permit the placement of the numerous transducing devices in, on and around the heart to evaluate ventricular performance before, during the development of, and after the development of myocardial ischemia. The extensive measurements and calculations required to assess performance via analysis of a succession of cardiac cycles during control periods, and periods of experimental intervention, will be accomplished with the aid of a system which includes access to a high-speed digital computer.

Arkansas

Biology, Control, Predisposing Factors, and Consequential Effects of Parasitism in Domestic Animals

Investigator: J. F. Brown
Start: August 1962
Terminate: June 1975

Accession Number: 004
Location: University of Arkansas
Fayetteville, Arkansas 72701

Objectives:

Conduct a continuing evaluation on the epizootiology of parasitic disease of domestic animals in Arkansas. Conduct a continuing evaluation of antiparasitic compounds as to efficacy, application, and methodology of administration. Consider the economic aspects of various programs of parasite control. Investigate methods of preventing and eliminating antiparasitic and other drug residues from domestic animals.

Approach:

Routine fecal specimen evaluation and autopsies for parasite burden will be conducted on various groups of research animals in cooperation with other project leaders. Administration and evaluation of approved and experimental drug compounds for activity against animal parasites in University-owned research livestock. Measure economic parameters of various parasite control procedures. Evaluate the systemic effects of various antiparasitic drug compounds on domestic animals and develop techniques to control and remove drug residues.

Arizona

Structural Studies of Synthetic Hormones and Polypeptides

Investigator: V. J. Hruby
Start: August 1970
Terminate: August 1971

Accession Number: 005
Location: Graduate School
University of Arizona
Tucson, Arizona 85721

Objectives and Approach:

The topographical structure of the hormones oxytocin and glucagon will be investigated, using a variety of spectroscopic methods including a combination of infrared, ultraviolet, optical rotatory, dispersion, and nuclear magnetic resonance techniques, with special emphasis on the latter. These methods will also be used to study a series of oxytocin analogs previously synthesized or synthesized during the course of this work, and to study several polypeptide fragments of glucagon. Also an investigation is planned of the structure of a polypeptide fragment of the protein, horse heart cytochrome c, choosing a fragment which contains the heme and metal moieties essential for the biological function and structure of the protein.

California

Neuropathologic Mechanisms in Animals

Investigator:	D. R. Cordy	Accession Number:	006
Start:	February 1964	Location:	School of Veterinary Medicine
Terminate:	June 1975		University of California
			Davis, California 95616

Objectives:

Explain basic mechanisms in neuropathologic diseases of animals, especially aspects of edema, malacia, and hydranencephaly.

Approach:

Continue the study of proximate and ultimate causes, precise site of injury, nature of injury, temporal development, and eventual consequences of certain specific diseases which provide models of a number of basic neuropathologic processes. Use will be made of the methods of light and electron microscopy, histochemistry and enzymology, biochemistry, and immunopathology. Work will progress simultaneously on several facets of interrelated conditions with options kept open to attack other mechanisms as material is available.

Duration of Immunity Following Vaccination to Venezuelan Equine Encephalitis (VEE)

Investigator:	G. L. Crenshaw	Accession Number:	007
Start:	April 1972	Location:	University of California
Terminate:	October 1974		Davis, California 95616

Objectives:

Determine the duration of immunity to Venezuelan Equine Encephalitis (VEE) provided by vaccination with a modified-live virus vaccine.

Approach:

Horses with known vaccination records will be tested for antibodies to Venezuelan Equine Encephalitis (VEE) virus, selected horses will be sent to the USDA laboratory at Denver for challenge with the virulent strain of VEE virus.

Venezuelan Equine Encephalitis Surveillance
in Southern California

Investigator: G. L. Crenshaw Accession Number: 008
Start: December 30, 1971 Location: University of California
Terminate: December 30, 1972 Davis, California 95616

Objectives:

Conduct surveillance in birds and mammals on the possible prevalence of VEE in Imperial, San Diego and Riverside Counties in Southern California by

1. providing a sentinel system for detecting presence, absence or changing prevalence of VEE,
2. providing data on possible Vee in migratory waterfowl, and
3. providing baseline data for VEE antibodies in birds and mammals.

Approach:

Conduct a serologic and virologic survey of possible VEE in the indicated counties of Southern California, especially in the equine, bovine, domestic canine and wild avian species. Arthropod vectors will be collected and examined for possible presence of VEE virus.

Structures of Trypsin, Chymotrypsin and Cytochrome C

Investigator: Richard E. Dickerson Accession Number: 009
Terminate: 1972 indefinite Location: California Institute of
Technology
1201 E. California Blvd.
Pasadena, California 91109

Objectives:

Characterize the structures of trypsin, chymotrypsin and cytochrome c.

Approach:

Compare the isomorphous bonito cytochrome c with the horse ferricytochrome c. Three heavy atom derivatives of tuna ferrocytochrome c have been prepared. A high-resolution on 2.8 Å map of the ferrocytochrome c should be attained within a year. Studies will also be initiated on cytochrome c from yeast, *Pseudomonas aerogenes* and other organisms.

Enzyme Catalysis

Investigator: M. F. Dunn Accession Number: 010
Start: September 1971 Location: School of Agriculture
Terminate: September 1972 University of California
Riverside, California 92502

Objectives and Approach:

This research project is concerned with investigating the two active sites of Horse Liver Dehydrogenase (LADH). Rapid kinetic experiments from this

and other laboratories have shown the two active sites of LADH to be catalytically nonequivalent. Nevertheless, sequence studies indicate the polypeptide chains of the individual LADH subunits are identical in amino acid sequence. It is therefore likely that site nonequivalence arises from the ligand-mediated dynamic interaction of LADH subunits during catalysis.

It is anticipated that this project will contribute to the molecular understanding of the many biological functions of subunit protein systems.

Burro Activity Evaluation in Death Valley National Monument California

Investigator:	C. G. Hansen	Accession Number:	011
Start:	July 1969	Location:	c/o Dept. of Biological Sciences
Terminate:	Indefinite		University of Nevada
			Las Vegas, Nevada 89109

Objectives:

The general objective of the study is to evaluate the effect of burros on the ecosystem. Specific objectives are: (1) determine the past and present distribution of burro in Death Valley, (2) establish the abundance and distribution of native biota in comparable habitats with and without burro use, (3) determine the effect upon the total ecosystem by burros in relation to their abundance, and (4) establish habitat requirements for burro in Death Valley.

Approach:

A critical examination will have to be made of the biota in selected areas where burros have and have not been living. This will be necessary in order to evaluate the effect of the burro upon the ecosystem. Data are being collected on: (a) forage species; (b) water resources; and (c) burro numbers and distribution from past records and current field investigations. Because of the vastness of the area occupied by burros and the remoteness of the terrain it is necessary to travel on foot, horse, four-wheel vehicles, and in the air.

A preliminary sampling of the vegetation is being carried out in preparation for a more intensive study of the plant ecology of the area.

Social Behavior of Feral Burros in Death Valley National Monument California

Investigator:	C. G. Hansen	Accession Number:	012
Start:	March 1970	Location:	c/o Dept. of Biological
Terminate:	September 1972		Sciences
			University of Nevada
			Las Vegas, Nevada 89109

Objectives:

To analyze intraspecific variation in the social organization and communication behavior of a free-ranging equid. Also to determine the relative importance of environmental parameters such as vegetation and climate on band size, cohesiveness, intolerance to conspecifics and general social behavior.

Approach:

General and detailed diurnal and nocturnal observations will be made in Death Valley National Monument of California and Nevada in an effort to get as complete data as possible on general behavior patterns. Photographic data will be used to record motor patterns, so that comparison of frames, time interval, and context; variation and similarity between bands can be systematically analyzed and criteria of basic behavioral patterns be set up.

Three-dimensional Structure and Function of Biological Macromolecules

Investigator: J. Kraut
Start: August 1971
Terminate: August 1972

Accession Number: 013
Location: Graduate School
University of California
P.O. Box 109
San Diego, California 92038

Objectives:

Characterize the three-dimensional structures of enzymes and other protein molecules, and the relationship of these structures to their biological activity and evolution.

Approach:

Perform single-crystal X-ray diffraction analysis. Specific immediate plans include 1) further characterization of the mechanisms of substrate binding and catalysis in subtilisin and how these compare with chymotrypsin; 2) refinement of the structure of chymotrypsinogen and further investigation of the activation mechanism; 3) building a 2.5A model of cytochrome C sub 2 and comparison with horse-heart cytochrome c; 4) refinement of the structure of HiPIP and study of any conformational differences between the reduced and oxidized form, and 5) continued searching for other biologically significant problems amenable to illumination by the methods of X-ray crystallography.

Studies of Pregnant Mare Serum Gonadotropin

Investigator: Prof. H. Papkoff
Start: June 1972
Terminate: May 1973

Accession Number: 014
Location: Hormone Research Laboratory
551 Parnassus Ave.
San Francisco, Calif. 94122

Objective:

Characterize the mechanism of gonadotropin action of the molecular level.

Approach:

It possesses both follicle stimulating hormone (FSH) and interstitial cell-stimulating hormone (ICSH,LH) activity. The techniques of protein and polypeptide chemistry are being employed to obtain PMSG in highly purified form such that it can be employed for unambiguous structural analysis, immunochemical, and biological studies. Specific bioassays for ICSH and FSH are being employed to correlate the structural elements encountered to biological activity.

Structure and Function of the Cytochromes C

Investigator: H. A. Harbury
Start
Terminate:

Accession Number: 015
Location: University of California
Santa Barbara, Calif. 93106

Objective:

Characterize the structural and functional roles of certain of the side chain groups of the cytochromes C obtained from the heart muscle of the horse.

Approach:

Attention will be focused primarily on the groups involved in the binding between heme and protein, and on the side chains of potential importance in connection with electron and energy transfer.

Colorado

Pathogenesis of Venezuelan Equine Encephalitis in Horse, Laboratory Animals and Insect Vectors

Investigator: J. G. Bowne
Start: April 1972
Terminate: April 1977

Accession Number: 016
Location: Animal Disease Research Lab
Denver Federal Center Bldg. 45
Denver, Colorado 80225

Objectives:

Determine the pathology and cycle of infection caused by VEE in tissue culture, insect vectors, and target organs of infected horses. Determine route of infection, virus concentration in infected blood and efficiency of transmission of VEE virus by insect vectors.

Approach:

Infect various host systems with virulent and attenuated VEE virus and study the results via fluorescent antibody, histopathology, electron microscopy and selected virus assay systems. Determine threshold of infection of selected insect vectors. The viral concentrations and relationships with the formed elements of the blood and hematopoietic tissues of the horse will be determined. Determine the effect on virulence of serial passage of VEE from insects-horse-insect sequences.

Clinical and Immunologic Responses of Animals Inoculated with VEE Virus

Investigator: M. M. Jochim
Start: April 1972
Terminate: April 1977

Accession Number: 017
Location: Animal Disease Research Lab
Denver Federal Center Bldg. 45
Denver, Colorado 80225

Objectives:

Determine the viremic response in horses and other experimental animals following parenteral contact with Venezuelan Equine Encephalitis (VEE) virus antigens.

Approach:

Various VEE antigens will be isolated and purified and tested for this immunogenicity in susceptible animals. The antibody response will then be correlated with an immune challenge of the test animal with virulent VEE virus. Methodology will be developed to produce several antigens and systems for their analysis.

Transmission of Virus Diseases by Blood Feeding Gnats and Mosquitoes

Investigator:	R. H. Jones	Accession Number:	018
Start:	March 1966	Location:	Animal Disease Research Lab
Terminate:	June 1976		Denver Federal Center Bldg. 45
			Denver, Colorado 80225

Objectives:

Determine the vectors, delineate their roles, establish rearing techniques, investigate the vector-virus physiological relationships and evaluate control measures for insects that transmit virus diseases, especially diseases of sheep, cattle, and horses, such as blue-tongue and encephalitis.

Approach:

Propagate disease-free blood feeding gnats and mosquitoes for use in virus transmission studies with veterinarians. Conduct epidemiological studies in the field and develop methods for control of insect vectors. Conduct physiological and pathological studies of the vector insects.

Reproductive Capacity of the Stallion

Investigator:	B. W. Pickett	Accession Number:	019
Start:	July 1970	Location:	School of Veterinary Medicine
Terminate:	December 1974		Colorado State University
			Fort Collins, Colorado 80521

Objectives and Approach:

Investigate the effects of season and storage on survival of stallion spermatozoa in various extenders. Conduct field trials, by breeding mares under closely supervised conditions, to substantiate laboratory results. Study the duration cytology and kinetics of spermatogenesis, extragonadal sperm reserves, epididymal transit time and fate of unejaculated spermatozoa in the stallion.

District of Columbia

Influences of the Horse on the Materials Cultures of the Southwest, 1775-1875

Investigator:	R. E. Ahlborn	Accession Number:	020
Start:	July 1971	Location:	Museum of History & Technology
Terminate:	June 1972		Smithsonian Institution
			Washington, D.C. 20560

Objectives and Approach:

The program grows out of an exhibition and symposium set for late 1970 on the role of the horse as a factor influencing various aspects of material cultural and certain behavior patterns of the major ethnic groups in northern Mexico and our Southwest. The equipment of horse and rider evolved to a point where, in the period 1775 to 1875, marked influences and variations on the Spanish models are clearly visible. The military, domestic, commercial and recreational uses of the horse were reflected in a wide range of material artifacts. The title of this program will probably appear on the cover of a checklist of the artifacts displayed and of papers presented at a symposium.

Stabilization of Heme Proteins by Iron-Ligand Bonding

Investigator: Jacinto Steinhardt
Terminate: 1972 indefinite

Accession Number: 021
Location: Georgetown University
Room 305, Reiss Science Bldg
Washington, D.C. 20007

Objectives and Approach:

Investigate the effects of hemoglobin ligands, both physiological and non-physiological, on the stability of native proteins in their various oxidation states. Emphasis is being placed on the more difficult ferro forms of hemoglobin. The work routinely includes our new technique of mapping the sequence of reaction steps which include unfolding of the protein and detachment of the heme. Preliminary results now show that, unlike the oxidized form, ferrohemo globins may unfold without heme detachment, and that heme detachment requires a more acid pH than in the case of methemoglobin. It is intended to study further various aspects of this indication of a conformation difference between ferro- and ferri- hemoglobins. Scheduled for early investigation is work on the sequence of events in the regeneration of horse and human hemoglobins.

Florida

Identification and Control of the Major Gastrointestinal Parasites of Domesticated Animals

Investigator: R. E. Bradley
Start: July 1971
Terminate: December 1976

Accession Number: 022
Location: University of Florida
Gainesville, Florida 32601

Objectives:

Determine the incidence and distribution of major gastrointestinal parasites of domesticated animals in Florida and test chemotherapeutic and other control measures.

Approach:

Surveys will be conducted in geographic areas of Florida for gastrointestinal parasite incidence in representative groups of domesticated animals, including horses. The most important parasites will be identified and studied by the

use of sentinel animals and sentinel herds of flocks. Parasitic disease incidence plus management practices will be analyzed by a computer program to determine the most effective control measures.

Effect of 2-Thiouracil, and Other Antiviral Compounds
on Ribonucleic Acid (RNA) Viruses

Investigator:	P. T. Cardeilhac	Accession Number:	023
Start:	January 1971	Location:	University of Florida
Terminate:	June 1976		Gainesville, Florida 32601

Objectives:

Determine the mode of action of 2-thiouracil on Newcastle Disease Virus (NDV) as a model RNA virus and the value of 2-thiouracil on a related compound as a chemotherapeutic or prophylactic agent against disease caused by RNA viruses.

Approach:

Newcastle Disease Virus will be the principal model used in this study. The effect of antiviral agents on heat stabilization, hemagglutination titer and infectivity titer will be determined. The specific mechanism of action, such as prevention of attachment on penetration of the virus and effect on protein, nucleic acid, and envelope formation will be investigated. The therapeutic value of these agents for the treatment of Newcastle Disease or Equine Infectious Anemia will be studied.

Piroplasmosis of Horses

Investigator:	G. T. Edds	Accession Number:	024
Start:	February 1963	Location:	University of Florida
Terminate:	December 1972		Gainesville, Florida 32601

Objectives:

Develop improved diagnostic tests; identify parasite vector(s) in Florida; ascertain method of transmission; investigate methods of cultivation. Determine pathology, and evaluate chemotherapeutic agents. Develop methods for eradication of the disease.

Approach:

Develop improved diagnostic techniques, including physical and chemical examinations of diseased tissues. Study vector transmission and in vitro tissue culture propagation.

Florida Strain Venezuelan Equine Encephalitis
Surveillance in Southern Florida

Investigator:	N. J. Ehrenkranz	Accession Number:	025
Start:	June 26, 1972	Location:	Cedars of Lebanon Hospital
Terminate:	June 30, 1973		Miami, Florida 33152

Objectives:

Survey domestic animals, especially horses, for the possible presence of Florida Strain VEE virus and other arboviruses in Dade, Collier and Monroe Counties in southern Florida by:

1. providing a sentinel system for detection of changes in arboviral prevalence
2. providing baseline data on Florida Strain VEE antibodies
3. evaluating and interpreting the results of the epizootiological studies.

Approach:

Conduct serologic and virologic survey of arboviruses in southern Florida in the equine, bovine, caprine, porcine and domestic canine species.

**Virus-Host Cell Interactions and Interferon
in Equine Infectious Anemia**

Investigator: K. D. Ley
Start: January 1972
Terminate: June 1975

Accession Number: 026
Location: University of Florida
Gainesville, Florida 32601

Objectives:

Develop an improved method of assay for the virus of Equine Infectious Anemia (EIA). Elucidate the role of interferon, in horses chronically infected with EIA. Evaluate the potential of interferon for treatment of EIA.

Approach:

Use cell culture methods to measure radiouridine uptake and other changes which may be related to replication of EIA virus. As a means of ascertaining the role of interferon in the virus-host cell interaction of equine infectious anemia, determine whether or not leukocytes from EIA infected horses have the same ability to produce interferon in vitro as do leukocytes from uninfected horses. Determine EIA virus sensitivity to the action of interferon in vitro and evaluate the effect of parenteral injection or endogenous stimulation of interferon on prevention or elimination of chronic EIA in horses.

Physiology of Digestion in the Horse

Investigator: E. A. Ott
Start: July 1971
Terminate: June 1976

Accession Number: 027
Location: University of Florida
Gainesville, Florida 32601

Objectives:

Develop techniques for the study of the mechanisms of digestion and absorption in the horse. Identify dietary factors influencing the digestion and absorption of specific nutrients by the horse. Identify the factors influencing fermentation in the cecum and colon, the products of the fermentation and the extent to which they satisfy the animal's nutrient requirements.

Approach:

Cecal fistulated horses allowing access to the ileal-cecal orifice will be used in conjunction with conventional digestion studies to elucidate the

changes taking place in the various areas of the digestive system. The influence of ration type and nutrient source on the site of digestion and absorption will be studied. Dietary factors influencing cecal fermentation will be determined by sampling the cecal contents after ration changes. Absorption of fermentation products will be determined by isotopic labeling.

Preliminary Veterinary Science Research

Investigator:	C. F. Simpson	Accession Number:	028
Start:	June 1968	Location:	University of Florida
Terminate:	January 1999		Gainesville, Florida 32601

Objectives:

Investigate current problems on: Cassia Occidentalis Poisoning - Cattle; Salmonella Typhimurium infections in calves; Mycotoxicosis, Aflatoxicosis in swine and poultry; sterility and lameness of horses; infectious Anemia of horses; Anthelmintic evaluation in horses, poultry, dogs; Leptospirosis in cattle.

Approach:

Secure plant leaves, seeds; feed to cattle; examine clinical signs, lesions, diagnosis, experimentally infect; evaluate antibiotics for prevention and treatment; identify toxins; make chemical-biological analyses; characterize disease; characterize microorganisms and nutritional deficiencies producing sterility; evaluate rations and rate of bone formation, lameness by diagnostic X-ray; cultivate virus in vitro; develop diagnostic tests and vaccine; survey parasites and evaluate anthelmintic efficacy and safety; continue characterization of antigenic nature; develop more effective vaccine.

Georgia

Pharmacology of Nerve-Muscle Systems

Investigator:	J. M. Bowen	Accession Number:	029
Start:	May 1972	Location:	College of Veterinary Medicine
Terminate:	April 1973		University of Georgia
			Athens, Georgia 30601

Objectives and Approach:

The comparative pharmacology and physiology of neuromuscular transmission is being investigated in the frog, dog, cat, pig, cow, goat, and pony. Effects of d-tubocurarine and succinylcholine on miniature and end-plate potential amplitudes and frequencies in each specie will be determined. Alterations in frequency of nerve stimulation and iontophoretic application of calcium ions will be utilized to record transmitter-end-plate potential dose-response curves for pharmacokinetic analysis. Centrally acting muscle relaxants will be evaluated by use of the pectineus reflex and the H-reflex in the dog. Special attention will be given the influence of the muscle spindle on response to these drugs. The origin of positive potentials of denervation in the canine pectineus muscle will be determined. A digital computer will

be employed for measurement of end-plate potentials, miniature end-plate potentials, and positive potentials of denervation, and for analysis of the pectineus reflex.

Positive Potentials of Denervation

Investigator:	J. M. Bowen	Accession Number:	030
Start:	February 1972	Location:	College of Veterinary Medicine
Terminate:	January 1974		University of Georgia
			Athens, Georgia 30601

Fibrillation potentials and positive sharp waves or positive potentials of denervation (PPD) will be recorded electromyographically from denervated, mammalian skeletal muscles. A comprehensive evaluation of the nature of PPD is the primary objective of this research. Species involved in this study include dog, cat, pig, goat and pony. The time course on onset and disappearance of PPD after denervation will be examined to determine the diagnostic reliability of these potentials as compared to fibrillation potentials. Measurement of PPD will be performed by a digital computer programmed to provide a frequency spectrum analysis of electromyograms. The use of digital or analog filters to establish the presence of PPD during the period of peak electromyographic activity after denervation will be studied. The applicability of the volume conductor theory in providing an explanation of the configuration of PPD will be considered and should lead to an understanding of whether these potentials are propagated. Effects of many factors on PPD will be studied. These include type of recording electrode, type of muscle (fast or slow in cat), potassium ions, magnesium ions, pentobarbital, d-tubocurarine, endrophonium, limb perfusion, and electrode movement.

The Pharmacodynamics of Halothane vs Halothane Nitrous Oxide Anesthesia in the Equine

Investigator:	R. J. Duncan	Accession Number:	031
Start:	July 1, 1972	Location:	College of Veterinary Medicine
Terminate:	June 30, 1973		University of Georgia
			Athens, Georgia 30601

Objectives and Approach:

Develop an anesthetic regime for the equine which more closely approaches the ideal. Specifically, this proposal is to compare the anesthetic and analgesic effects of Halothane to the combination of Halothane and nitrous oxide in the equine.

The Influence of Air on the Endometrium of the Mare

Investigator:	D. M. Witherspoon	Accession Number:	032
Start:	July 1, 1972	Location:	College of Veterinary Medicine
Terminate:	June 30, 1973		University of Georgia
			Athens, Georgia 30601

Objective and Approach:

The objective of this proposed research is to determine the influence of air on the endometrium of the mare during viewing or photographic procedures. Any alternation in the color of the endometrium caused by insufflation will be determined.

Idaho

Sexual Behavior of Horses

Investigator:	B. W. Stebbins	Accession Number:	033
Start:	November 1971	Location:	Idaho State University
Terminate:	June 1974		Pocatello, Idaho 83201

Objectives:

Determine the components of equine sexual behavior with an emphasis upon the behavior of stallions, and determine what effects confinement might have upon reproductive success.

Approach:

Study horses at the three Appaloosa ranches of Richard Stanger located near Idaho Falls, Idaho; and also Merkley's Arabian ranch in Pocatello, Idaho.

Social Structure in Horses

Investigator:	Mary N. C. Stebbins	Accession Number:	034
Start:	January 1971	Location:	Idaho State University
Terminate:	June 1973		Department of Biology Pocatello, Idaho 83201

Objectives:

Determine a possible dominance hierarchy in mares, determine the nature of the social structure among mares and learn as much as possible about other aspects of social structure in horses.

Approach:

Study the horses at Stanger's Appaloosa ranches located in 3 areas around Idaho Falls, one east of Idaho Falls, one west of Idaho Falls, and one in Bone, Idaho, southeast of Idaho Falls and Merkeley's Arabian Ranch at Pocatello, Idaho

Illinois

Nutritional Factors Influencing Equine Growth and Productivity

Investigator:	W. W. Albert	Accession Number:	035
Start:	October 1971	Location:	University of Illinois
Terminate:	October 1974		Urbana, Illinois 61801

Objectives:

Compare digestibility of several diets for the horse, pony, and sheep. Determine influence of pelleting on rate of passage and digestion by the horse. Characterize quantity and composition of milk produced by mares. Characterize relationship of lactic acid to laminitis of the pony.

Approach:

Conduct digestion and metabolism studies with adult sheep, ponies and horses with a medium energy, moderate fiber diet in the whole form or following grinding and pelleting. Pelleted diets of varied fiber content will be fed to adult ponies and horses to determine the fiber content required to maintain energy equilibrium. Study loss of energy as methane by ponies on several diets in metabolic chambers. The lactation curve for mares will be plotted by determining weight change of the foal during restricted nursing periods. Milk samples periodically obtained will be analyzed for fat, protein, solids, calcium and phosphorus and total energy content. A mixture of lactone-free D-L acid will be infused intravenously into ponies in varying dosages. Blood D-lactate and total lactic acid will be monitored. If symptoms of laminitis can be induced, similar infusions into the cecum through a cecal fistula will be conducted. Subsequent dietary modifications will be examined for prevention of laminitis.

Mechanisms Controlling Sequence of Events at Ovulation

Investigator: P. J. Dziuk
Start: February 1969
Terminate: June 1975

Accession Number: 036
Location: University of Illinois
Urbana, Illinois 61801

Objectives:

Study those aspects of ovulation that appear to be amenable to manipulation and control and attempt to devise methods for control and appointment of the time of ovulation in pigs, sheep and ponies.

Approach:

The time of ovulation following an injection of human chorionic gonadotrophin (HCG) and the stages of maturation of the oocyte of the pony will be determined by examination of ovaries and oocytes. Fertility will be determined by examining fertilized eggs and embryos. In sheep artificially inseminate relative to HCG to determine fertility under a scheme to control ovulation time. In gilts look for an endocrine relationship to delayed puberty such as high levels of progesterone in the plasma of noncyclic gilts. Study a possible relationship between a response to follicle stimulating hormone and subsequent numbers of ovulations.

Research on African Swine Fever and Preparation of Autotutorial Material on Exotic Animal Diseases

Investigator: D. H. Ferris
Start: June 1972
Terminate: June 1973

Accession Number: 037
Location: University of Illinois
Urbana, Illinois 61801

Objectives:

Study the pathogenesis of African swine fever virus and prepare autotutorial material on a variety of exotic animal diseases research at the Plum Island Animal Disease Laboratory.

Approach:

Explore the mechanism of the virus-host relationship and attempt to explain the origin of the immunity, if any, relating it to cell mediated immunity in African swine fever. Prepare autotutorial material for training purposes on a variety of exotic animal diseases including foot-and-mouth disease, African swine fever, rinderpest, African horsesickness, and others researched at the Plum Island Animal Disease Laboratory.

Studies on Bone Development in the Equine

Investigator:	H. J. Hardenbrook	Accession Number:	038
Start:	July 1, 1971	Location:	University of Illinois
Terminate:	June 30, 1972		Urbana, Illinois 61801

Metabolism Kinetics of Drugs in Horses:

Effect on Coagulation Factors and
Cardiovascular System

Investigator:	R. P. Link	Accession Number:	039
Start:	July 1, 1971	Location:	University of Illinois
Terminate:	June 30, 1972		Urbana, Illinois 61801

Study of the Structure, Circulation and Function
of the Proximal Sesamoid Bones of Horses Relative
to Development of Sesamoiditis

Investigator:	J. E. Lovell	Accession Number:	040
Start:	July 1, 1971	Location:	University of Illinois
Terminate:	June 30, 1972		Urbana, Illinois 61801

Laboratory Diagnosis of Equine Infectious Anemia

Investigator:	D. Segre	Accession Number:	041
Start:	July 1, 1971	Location:	University of Illinois
Terminate:	June 30, 1972		Urbana, Illinois 61801

Indiana

Nutrient Requirements and Interrelationships

Investigator:	W. M. Beeson	Accession Number:	042
Start:	May 1965	Location:	Purdue University
Terminate:	June 1975		Lafayette, Indiana 47907

Objectives:

Determine the nutrient requirements of animals where voids exist and their biological interrelationships to various nutrients and feed additives with special emphasis on cattle, horses, sheep and swine. Evaluate the nutritional value of new high-protein cereal grains.

Approach:

Nutrient requirements, biological interrelationships and unidentified factors will be established by using purified, semipurified and semipractical diets with growth studies and balance techniques. New high-protein cereal grains will be tested by growth studies, biological evaluation of the protein and chemical nature of the nutrients. Feed additives will be mostly involved with feeding experiments with animals and a study of their metabolic function.

Helminth Parasites of Domestic Livestock

Investigator: D. G. Bennett

Accession Number: 043

Start: May 1966

Location: Purdue University

Terminate: June 1976

Lafayette, Indiana 47907

Objectives:

Define parasite problems in Indiana livestock. Reduce losses due to helminth parasites in livestock.

Approach:

Conduct post mortem surveys of species and numbers of helminths in naturally infected livestock. Animals purchased specifically for the research will be used. Conduct critical trials for evaluating new and currently available anthelmintics for livestock. Compare different anthelmintics in conventional farm situations. Use controlled experimental design. Evaluate methods of administration of anthelmintics to livestock. Conduct comparative production and performance studies of livestock on various levels of nutrition experimentally infected with helminths.

Properties of Immunoglobulins of Domestic Animals

Investigator: M. J. Freeman

Accession Number: 044

Start: July 1969

Location: Purdue University

Terminate: June 1974

Lafayette, Indiana 47907

Objectives:

Elucidate and compare the spectrum and function of the antibodies, or immunoglobulins, of the major species of domesticated mammals.

Approach:

Experimental groups of sheep, cattle, and horses will be immunized with various soluble or particulate antigens. Different routes and schemes of immunization may be evaluated. Sera for evaluation will be obtained periodically after primary, secondary or subsequent courses of immunization. Several immunologic methods will be used to determine the spectrum and functional properties of serum antibodies throughout the response. Serum will be fractionated by several methods to aid in the characterization of individual classes of antibody.

Metabolic and Congenital Bone Diseases of Animals

Investigator: A. M. Gallina Accession Number: 045
Start: July 1971 Location: Purdue University
Terminate: June 1976 Lafayette, Indiana 47907

Objectives:

Evaluate and experimentally reproduce bone diseases seen in the field.

Approach:

Nutritional deficiencies, arthritic conditions, infections and unexplained pathologic fractures will be investigated. Disease conditions will be reproduced under controlled experimental conditions simulating field conditions. Quantitative estimates will be made by the use of fluorescent multiband labels, radiography, microradiography, histochemistry, and histologic examinations. Radioisotopes and autoradiography will be utilized when feasible. Clinical biochemistry and microbiology will be used extensively to evaluate the observed changes.

Inapparent Viral Infections of Animals

Investigator: D. P. Gustafson Accession Number: 046
Start: July 1, 1972 Location: Purdue University
Terminate: June 30, 1977 Lafayette, Indiana 47907

Objectives:

Obtain information on conditions under which pseudorabies virus and other herpes viruses are intermittently shed from animals in symptomatic remission. Determine the role of viral isolates in chronic equine diarrhea. Find prophylactic or therapeutic means of coping with congenital tremors in swine, chronic equine diarrhea, pseudorabies and other herpes herpesviruses.

Approach:

Viruses involved in latent infections will be studied in the susceptible species, laboratory animals and in cell cultures. Antigen-antibody relationships in periods of latency and exacerbation would be evaluated in the test animals. Attempts will be made to isolate viruses from selected cases of unknown etiology and characterized with the disease syndrome and the virus biochemically and biophysically. Develop and evaluate prophylactic or therapeutic measures including anti-serum, attenuated viral vaccines, inactivated viral vaccines, and induction of interferon.

Etiology of Postnatal Diseases of Farm Animals

Investigator: W. W. Kirkham Accession Number: 047
Start: July 1969 Location: Purdue University
Terminate: June 1974 Lafayette, Indiana 47907

Objectives:

Find causes of disease during early life of domestic animals including ecology, nutrition, pathogenic agents often found associated with diseases processes.

Approach:

Evaluate sick animals presented to the diagnostic laboratory and intensively study those warranting extra effort. Record data pertaining to econology, nutrition, histopathology, other specific procedures as needed. As data accumulates indicating significant patterns present, attempts will be made to reproduce a given clinical syndrome or disease. Emphasis will be on swine due to their importance in economy of State. Other farm animals, including horses, will also be used in this research project.

Hematologic Diseases of Domestic Animals

Investigator: J. E. Lund
Start: July 1971
Terminate: June 1976

Accession Number: 048
Location: Purdue University
Lafayette, Indiana 47907

Objectives:

Diagnose and categorize the infectious and non-infectious blood diseases of domestic animals in the State of Indiana.

Approach:

Blood samples of animals presented to the Purdue Veterinary Clinics will be examined cytologically and chemically for the presence of hematologic disease. Field studies will be performed when the situation warrants this approach. Those diseases that can be experimentally reproduced will be intensively studied in an attempt to develop prophylactic or therapeutic measures.

Immune Response of the Horse

Investigator: R. L. Morter
Start: April 1965
Terminate: June 1975

Accession Number: 049
Location: Purdue University
Lafayette, Indiana 47907

Objectives:

Elucidate the immune response of the horse and purify, characterize and define the biological activity of the various immunoglobulins produced. Definition of the relationship of these immunoglobulins to various immunologically mediated diseases will be undertaken.

Approach:

Horses and ponies will be immunized with a series of antigens with or without adjuvant. Antigens of different chemical composition and molecular structure will be included. Following immunization serum will be harvested and chemically fractionated to obtain purified immunoglobulins. Specific antibodies to each of the immunoglobulins will be produced in goats or rabbits to provide the necessary immunoreagents for immunoelectrophoresis, radioimmuno-electrophoresis, antigen binding tests, and other immunologic tests that would be indicated to define the biologic function of the immunoglobulins. Amyloidiosis or uveitis will be experimentally induced in ponies or horses. Immunocytological methods will be utilized to elucidate the role of the immune response in the pathogenetic mechanism of the diseases. The technics

to be employed will include fluorescent antibody, immunoferritin, immunoperoxidase, and elution of immune-complexes from affected tissues. Cytologic evaluation would be accomplished with light, ultraviolet and electron microscopy.

Orthopedic Pathology of Domestic Animals

Investigator:	D. C. Van Sickle	Accession Number:	050
Start:	July 1969	Location:	Purdue University
Terminate:	June 1974		Lafayette, Indiana 47907

Objectives:

Study and correlate bone diseases, e.g., osteoarthritis, of domestic animals within and between breeds and species with data from control studies. Develop and experimentally test hypotheses developed from this data.

Approach:

Evaluate herd management, blood chemistry, and gross appearance of joints. Record location and size of lesions and radiograph and photograph them. Establish bone-muscle weight ratios. Determine joint tissue pathology and degree of bone remodeling. The source of cellular or matrical degeneration will be evaluated.

Liver Aldehyde Dehydrogenase and Application of Spin-labeling

Investigator:	H. Weiner	Accession Number:	051
Start:	January 1972	Location:	School of Agriculture
Terminate:	June 1973		Purdue University
			Life Sciences Bldg.
			Lafayette, Indiana 47907

Objectives and Approach:

Physical and catalytic properties of horse liver aldehyde dehydrogenase will be determined, with respect to subunit make-up, rate determining step and reasons for the ordered binding sequence.

Study the interactions between subunits of dehydrogenases and determine the distances and orientation of the substrate to the coenzyme. The interactions between the subunits may be responsible for some of the regulatory properties of the enzymes. An investigation of electron paramagnetic and nuclear magnetic resonance properties of both covalent spin labeled enzymes and of a spin-labeled analog of NAD with dehydrogenases and their substrates will be employed. This should lead to a better understanding of the relationship between coenzyme and substrate.

Iowa

Immunologic Competence of Newborn Foals

Investigator:	Tracy Clark	Accession Number:	052
Start:	October 1, 1972	Location:	College of Veterinary Medicine
Terminate:	September 30, 1973		Iowa State University
			Ames, Iowa 50010

Objective:

Study the relationship between the foal and the dam regarding the development of immunity to infectious diseases

The Effects of Mycotoxins on Animals

Investigator: S. J. Cysewski
Start: June 1965
Terminate: February 1976

Accession Number: 053
Location: National Animal Disease Lab
P.O. Box 70
Ames, Iowa 50010

Objectives:

Study the biological effects of mycotoxins on domesticated animals. Correlate the clinical, clinical pathological and histopathological changes following the administration of mycotoxin to selected animal species. Develop criteria for the diagnosis and treatment of specific intoxications.

Approach:

Produce in culture, extract and administer known quantities of crude, refined or purified mycotoxins to susceptible subjects including appropriate laboratory animals, poultry, calves, sheep, pigs, and horses. Conduct chemical and biochemical characterizations of mycotoxin extracts and their effects on animals through biochemical, clinicopathological and histological examinations. Conduct examinations so as to permit temporal association between deviations from normal form and function with toxin administration. Develop presumptive and definitive criteria for diagnosis of specific mycotoxicoses in domestic animals. Determine pathogenesis of specific mycotoxicoses and attempt treatment to counteract biological effects of toxin consumption.

The Use of Glyceryl Guaiacolate as an Adjuvant to Anesthesia in Equine

Investigator: Larry Jackson
Start: January 1, 1972
Terminate: December 31, 1972

Accession Number: 054
Location: College of Veterinary Medicine
Iowa State University
Ames, Iowa 50010

Objective:

Study the muscle relaxant and anesthetic properties of glyceryl guaiacolate in horses.

Swamp Fever in Equines

Investigator: L. Kemeny
Start: November 1966
Terminate: November 1972

Accession Number: 055
Location: National Animal Disease Lab
P.O. Box 70
Ames, Iowa 50010

Objectives:

Develop specific laboratory diagnostic procedures and characterize the virus of equine infectious anemia and its homologous antibody.

Approach:

Initial investigations will include the procurement and testing of available strains of equine infectious anemia (EIA) virus in susceptible test animals. The virus will be fractionated, purified, and classified according to recognized procedures such as size, ether sensitivity, pH stability, antigenic properties, and electron microscopy. Since virus and homologous antibody coexist in the blood, serum, and tissues of the natural host, procedures will be investigated for the separation and purification of virus and antibody.

Kansas

Hepatic Organic Anion Transport Mechanisms

Investigator:	R. R. Gronwall	Accession Number:	056
Start:	May 1972	Location:	School of Veterinary Medicine
Terminate:	April 1973		Kansas State University
			Anderson Hall
			Manhattan, Kansas 66502

Objective:

Study the mechanisms involved in transport of large organic anions from plasma to bile and isolate and characterize a hepatocyte membrane protein which may act as a bilirubin transport carrier.

Approach:

Utilize mutant Southdown sheep with an inherited hepatic anion transport defect, mutant Corriedale sheep with an inherited hepatic anion transport defect and the fasted horse which exhibits a reproducible change in hepatic anion uptake.

Studies on the Toxicologic Effects of SD15803 (Methoctovos) on Horses

Investigator:	S. M. Kruckenberg	Accession Number:	057
Terminate:	June 1975	Location:	Kansas State University
			Manhattan, Kansas 66504

Objectives:

Not provided.

Approach:

Not provided.

Preliminary Investigation of Current Medical Problems

Investigator:	J. E. Mosier	Accession Number:	058
Start:	September 1957	Location:	Kansas State University
Terminate:	June 1975		Manhattan, Kansas 66504

Objectives:

Initiate preliminary inquiry as to the cause, progression, and control of those disease problems which are important to the health of animals and

man and which occur intermittently during the course of the year. Procure animals, scientific supplies and provide assistance to clinical investigators.

Approach:

Specific problems will be selected from the medical or research area.

Projects undertaken will be funded for a preliminary study. Those which cannot be concluded in a short interval or which show need for additional investigation will be assigned a number and further funding will be requested for the specific project.

Preliminary Investigation of Current Surgical Problems

Investigator: J. E. Mosier

Accession Number: 059

Start: September 1967

Location: Kansas State University

Terminate: June 1975

Manhattan, Kansas 66504

Objectives:

Provide the instrumentation, animal resources, and initial supplies for preliminary studies of surgical procedures needed to provide experimental models for the animal scientists and for the initiation of investigations concerning the correcting or control of those conditions which are presented to the veterinary clinic and which are potentially amendable to surgical repair.

Approach:

Specific problems will be selected from the surgical or research area.

Projects undertaken will be funded for a preliminary study. Those which cannot be concluded in a short interval or which show need for additional investigation will be assigned a number and further funding will be requested for the specific project.

Erythrocyte Enzymopathies in Animals

Investigator: J. E. Smith

Accession Number: 060

Start: July 1972

Location: Kansas State University

Terminate: June 1977

Manhattan, Kansas 66504

Objectives:

Characterize a partial gamma-glutamylcysteine synthetase deficiency in sheep and its effects on erythrocyte integrity under normal stress conditions. Search for other erythrocyte enzymopathies in horses and other animals that may serve as models for man.

Approach:

Characterization of the gamma-glutamylcysteine synthetase of glutathione deficient sheep, in vivo manifestations and in vitro effects of erythrocyte glutathione deficiency, and the relationship of the metabolic defect to overall glutathione metabolism. All experiments will be performed with low glutathione erythrocytes paired with red cells from normal sheep of similar breeding. If appropriate, normal human blood will also be utilized.

Kentucky

Factors Affecting Energy Utilization in the Equine

Investigator: J. P. Baker
Start: November 1967
Terminate: June 1972

Accession Number: 061
Location: University of Kentucky
Lexington, Kentucky 40506

Objectives:

Measure digestion of starch and cellulose and production of glucose and volatile fatty acids in the equine intestinal tract. Investigate influence of diet changes in the equine tract. Measure absorption from the tract.

Approach:

Disappearance of dietary starch and cellulose from different segments of the equine intestinal tract will be measured using the chromic oxide ration technique with fecal samples and with digesta samples drawn from permanent fistulae installed in the ceca and the dorsal and ventral colons of horses fed conventional hay-grain rations. The influence of changes in dietary fiber and starch upon digestive activity in the different segments of the tract will be assessed. Differences in portal and carotid blood levels of glucose and volatile fatty acids will be used to estimate absorption from the equine intestinal tract.

Factors Affecting Nitrogen Utilization in the Equine

Investigator: J. P. Baker
Start: January 1968
Terminate: June 1972

Accession Number: 062
Location: University of Kentucky
Lexington, Kentucky 40506

Objectives:

Measure protein degradation in the equine intestinal tract. Determine the extent of microbial protein synthesis in the equine tract. Measure the extent of nitrogen absorption from the equine large intestine.

Approach:

Pre- and post-cecal disappearance of dietary nitrogen from three different sources will be measured using the chromic oxide ratio technique with fecal samples and with digesta samples drawn from permanent cecal fistulae installed in ponies fed completely pelleted rations. The role of intestinal microbial protein synthesis in supplying the protein needs of the equine will be investigated by measuring the effect of cecal infusion of non-protein nitrogen upon nitrogen balance in ponies being fed a basal diet deficient enough in protein to produce a negative nitrogen balance. Differences in portal and carotid blood levels of amino acids, and the absorption of labeled amino acids into the portal system will be used to estimate amino acid absorption from the equine intestinal tract.

Dietary Factors Affecting Calcium and
Phosphorus Utilization in the Equine

Investigator: J. P. Baker
Start: September 1971
Terminate: June 1976

Accession Number: 063
Location: University of Kentucky
Lexington, Kentucky 40506

Objectives:

Determine the influence of dietary ratio of calcium to phosphorus on calcium and phosphorus absorption in the equine. Determine the influence of dietary lactate and intestinal hydrogen ion concentration on the absorption and utilization of calcium and phosphorus in the equine. Determine the availability of dietary sources of calcium and phosphorus for the equine.

Approach:

Six ponies will be used to determine the influence of different ratios of calcium to phosphorus on the absorption of the minerals as measured by balance trials and by an isotope dilution technique. The effect of diet on the lactate content and pH of the equine gastro-intestinal tract and the influence of these factors on calcium and phosphorus absorption will be measured. Absorption of calcium and phosphorus from supplemental sources containing the minerals in various ratios will be measured in ponies.

Immunological and Pathological Studies on
Venezuelan Equine Encephalitis

Investigator: J. T. Bryans
Start: April 1972
Terminate: August 1974

Accession Number: 064
Location: University of Kentucky
Lexington, Kentucky 40506

Objectives:

Characterize the passive immune response of foals whose dams have been vaccinated with the modified live VEE virus. Determine the effect of the vaccine virus on the developing foal.

Approach:

An immunoglobulin profile will be compared in mares and their foals before and after colostrum feeding to determine the passive immunity passed on to the foal. Foals will be infected in utero to determine the effect of the vaccine virus on the developing foal.

Pathology of Spontaneous Diseases of the Horse

Investigator: M. W. Crowe
Start: May 1961
Terminate: December 1976

Accession Number: 065
Location: University of Kentucky
Lexington, Kentucky 40506

Objectives:

Describe the gross and microscopic anatomy observed in spontaneously occurring diseases of the horse and identify agents or factors responsible for the disease.

Approach:

Complete necropsy examinations will be performed on fetuses, foals and horses. Samples of organs will be collected and processed for histopathologic examination. Other tissues will be collected in an attempt to identify and characterize the infectious or chemical agents that may be the etiologic agent of the disease. Experimental animals will be exposed to suspected agents in an attempt to produce disease. The pathogenesis of the disease will be studied on entities that are reproduceable.

Internal Parasites of the Horse

Investigator: J. H. Drudge
Start: January 1947
Terminate: June 1972

Accession Number: 066
Location: University of Kentucky
Lexington, Kentucky 40506

Objectives:

Investigate efficacy and toxicity of chemotherapeutic agents. Study prepatent development, pathogenesis, and immunity with special reference to *Strongylus* sp. Investigate the epizootiology of *Strongyloides westeri*.

Approach:

Anti-parasitic activity of drugs will be determined in naturally infected animals. Subsequently, fecal egg and larval counts will be evaluated under field conditions. Internal parasites will be studied by isolation of single species and by experimental infection of foals raised without exposure to parasites. Emphasis will be on the most pathogenic forms of large strongyles. Origin and spread of *Strongyloides* infection in foals will be characterized.

Measurement of Behavioral Sources of Variation in Livestock Production Traits

Investigator: D. D. Kratzer
Start: July 1971
Terminate: June 1976

Accession Number: 067
Location: University of Kentucky
Lexington, Ky. 40506

Objectives:

Quantitatively evaluate learning, emotional and aggressive behaviors of livestock and evaluate the relations of these behaviors with traits of direct economic importance.

Approach:

Develop behavioral measurements that will objectively and conveniently detect individual differences. Measure traits of economic importance on those individuals measured in behavioral studies. Study the interrelations between behavioral and economical traits.

Physiology of the Reproductive Cycle in Mares

Investigator: R. G. Loy
Start: July 1969
Terminate: July 1974

Accession Number: 068
Location: University of Kentucky
Lexington, Ky. 40506

Objectives:

Determine relationships among sex hormone levels in body fluids; ovarian activity; sex behavior; reproductive tract changes during estrous cycle and influence of environmental changes associated with season of year. Study response of reproductive system to treatment with hormones and other pharmacological agents.

Approach:

Long-term study on a group of mares will include daily determination of estrus during the breeding season. Internal genitalia will be manually examined weekly during anestrus and daily during estrus. Urinary estrogens and progesterone metabolites on the same time schedule. Serum levels of pituitary hormones will be determined. On another group of mares, determine the effects of exogenous sex steroid on regulation of the estrus cycle.

Immunology of Equine Viral Arteritis

Investigator: W. H. McCollum
Start: July 1970
Terminate: June 1973

Accession Number: 069
Location: University of Kentucky
Lexington, Kentucky 40506.

Objectives:

Describe antibody qualities and response patterns. Correlate antibody values with infection and immunity. Further develop a modified live virus vaccine especially with regard to immunizing capacity and optimum storage conditions.

Approach:

Plaque reduction and complement fixation procedures will be used to measure antibody responses following virus and vaccine inoculations. Acute, convalescent and post-vaccination serums will be studied by immunoelectrophoresis. Fluorescent antibody and electron microscopy techniques will be utilized for a study of the sites of virus multiplication and lesion production. Attempts will be made to further modify the vaccine by use of diploid cell culture of equine origin and to test the modifications for antigenicity and protection qualities as well as the stability and immunogenicity under various storage conditions.

Soluble Proteins of Equine Blood and Mammary Secretions - Qualitative and Quantitative Characterization

Investigator: D. O. Morgan
Start: July 1971
Terminate: June 1975

Accession Number: 070
Location: University of Kentucky
Lexington, Kentucky 40506

Objectives:

Define the electrophoretic profile of the blood serum proteins of the equine as it evolves from the neonate to the aged animal. Determine times and capacities for absorption of intact macromolecules by the neonatal equine intestine. Characterize equine immunoglobulins and their biological role in the defense mechanisms of the equine.

Approach:

Normal serum protein profiles will be determined by standard physico-chemical procedures on blood serum samples from various breeds and age groups of horses from the neonate to maturity. Similar procedures will be used to investigate changes in serum protein profiles induced by specific diseases and immunizations, with special emphasis on the immunoglobulins. Mechanisms involved in absorption of macromolecules by the neonatal intestine will be studied in horses by the experimental feedings of foreign protein substances and by organ culture techniques.

Louisiana

Internal Parasites of Horses

Investigator: T. R. Bello
Start: July 1966
Terminate: June 1974

Accession Number: 071
Location: Louisiana State University
Baton Rouge, La. 70803

Objectives:

Develop an effective parasite control program, conduct ecological studies on equine parasites, survey the incidence and distribution of equine parasites in Louisiana, improve diagnostic procedures, and study the pathogenicity of the most prevalent parasites.

Approach:

Continue to study and expand the current regimen of treatments and to utilize non-treated control groups. Conduct ecological studies to determine factors involved in parasite transmission potential of contaminated pastures and confinement lots.

Characteristics and Preservation of Stallion Semen and its Use in Artificial Insemination

Investigator: L. Guthrie
Start: January 1967
Terminate: June 1974

Accession Number: 072
Location: Louisiana State University
Baton Rouge, La. 70803

Objectives:

Evaluate present methods and investigate improved procedures of collecting semen. Develop extenders for preserving horse semen in the liquid and frozen state. Study seasonal variation in semen quality and fertility and develop methods to alleviate the effects of seasons on fertility. Determine the age at which the male reaches puberty. Investigate methods of stimulation which would produce more sperm.

Approach:

Stallions are to be placed on a routine collection schedule in order to accumulate data on the seasonal variation of semen characteristics and to investigate methods of collection. Semen of acceptable quality will be used for laboratory investigations involving the development of diluents for liquid and frozen semen. Stimulation and puberty studies are to be started when sufficient stallions are made available.

The Epidemiology, Diagnosis and Control of Equine Infectious Anemia

Investigator: E. E. Roth
Start: September 1966
Terminate: November 1976

Accession Number: 073
Location: Louisiana State University
Baton Rouge, La. 70803

Objectives:

Further the knowledge of the epidemiology, transmission and pathogenesis of EIA upon which to base practical control measures that will reduce the incidence of the disease. Continue evaluation and improvement of the immunodiffusion test. Continue studies to improve the preparation of antigen and reference positive serum and the methodology for conducting the immunodiffusion test for EIA. Further propagate, purify, and characterize the virus or viruses associated with EIA.

Approach:

The immunodiffusion test will be employed to test groups of horses for possible EIA. Various plans will be followed with the goal of reducing transmission by segregation. Other groups will be set up as closed herds and tested periodically. Acceptable biochemical, immunological and analytical chemical methods will be employed to extract and improve the EIA antigen and reference positive serum and attempts will be made to

characterize the antigen. Methodology to be employed in the insect transmission studies will be developed.

Investigations on Equine Infectious Anemia

Investigator: E. E. Roth
Start: July 1967
Terminate: June 1972

Accession Number: 074
Location: Louisiana State University
Baton Rouge, Louisiana 70803

Objectives:

Determine the role of prenataally infected foals in the transmission of EIA and develop a tissue culture system for virus propagation.

Approach:

Pregnant mares, each infected with the causative virus separately and at different time intervals from conception will be utilized to determine the influence of perinatal infection on the natural expression of the clinically typical disease. Laboratory animals will be used to explore the potential for eventual use of animals other than equines as "tools" for experimentation. At present equines are the only known susceptible hosts.

Maryland

Relationship Between Performance and Behavior Patterns of Farm Animals

Investigator: J. Bond
Start: December 1971
Terminate: December 1974

Accession Number: 075
Location: Agricultural Research Center
Beltsville, Maryland 20705

Objectives:

Determine how type of diet, physiological state and stress affect performance and behavior of farm animals.

Approach:

The objective will be reached by studying the behavior patterns of farm animals maintained in confined conditions through the use of electronic instrumentation. Routine nutrition criteria will also be determined on the test animals in most studies. Emphasis will be placed on how differing diets and certain physiological parameters affect behavior. Stressors, such as loud noises, will also be studied.

Equine Piroplasmosis

Investigator: A. A. Holbrook
Start: May 1963
Terminate: February 1974

Accession Number: 076
Location: National Animal Parasite Lab.
Agricultural Research Center
Beltsville, Maryland 20705

Objectives:

Evaluate serological tests for equine carrier state; discover tick vectors of causal parasites; survey wildlife for Babesiae; determine Babesiae ultrastructures; develop recommendations for control or eradication of equine piroplasmosis.

Approach:

Maintain in quarantine Babesia equi carrier horses and evaluate serological tests monthly. Subinoculate susceptible horses for carrier state evaluation. Improve antigen production and storage. Ascertain tick transmitters of Babesiae. Study B. canis in dogs and B. rodhaini in rodents for basic aspects of infections. Determine Babesiae ultrastructures by electron microscope. Ascertain biochemistry of host-parasite relationships in equine piroplasmosis. Evaluate babesiacidal drugs.

Medical Virology - Clinical Investigations in Viral Infections and Diseases

Investigator: Dr. Julius A. Kasel
Start: May 1971
Terminate: Indefinite

Accession Number: 077
Location: National Institute of Health
Bethesda, Maryland 20014

Objectives and Approach:

Define and evaluate immunologic factors which contribute to host resistance to viral infections.

Investigate the feasibility of employing purified structural viral proteins and recombinant viruses that have been developed in the laboratory as vaccines for the control of disease in man.

Conduct clinical studies in individuals following experimental induction of nonbacterial gastroenteritis.

Utilize the Chincoteague pony as an animal model to study immunologic response to infectious or inactivated virus and to use viral infections as a means to investigate immunological systems.

Market Analysis of the Maryland Horse Industry

Investigator: R. G. Lawrence
Start: April 1970
Terminate: June 1973

Accession Number: 078
Location: University of Maryland
College Park, Maryland 20742

Objectives:

Estimate the size and marketing framework of the Maryland horse industry, the existing and potential market for pleasure horses in Maryland, and the

existing and potential market for Maryland-bred horses.

Approach:

A list and area survey will be utilized to provide information on the demand and supply side of the pleasure horse market and on the existing marketing framework, including channels currently used. The list frame will be utilized for a mail questionnaire and development of a sample for interview. The area frame of 250-300 segments will be utilized for complete enumeration of sample areas of the state. The latter will provide independent data and a control on the results of the list survey. Data collection and analysis of the market for Maryland-bred horses will be based on a national analysis of racing currently underway and will utilize breed association mare and stallion printouts to tabulate horses, and to pick the sample of breeders for interview. Available secondary data will also be utilized in estimating the market.

Analysis of Costs and Returns to the Breeder-Owner Sectors of the Maryland Horse Industry

Investigator: R. G. Lawrence
Start: May 1970
Terminate: May 1973

Accession Number: 079
Location: University of Maryland
College Park, Maryland 20742

Objectives:

Determine breeder-owner costs and returns relative to recent changes which have occurred in the industry; evaluate alternatives available to the breeder-owner sector.

Approach:

Breeder-owner lists from another research project will be utilized for a mail questionnaire and interview of horsemen to obtain data on such factors as investment, horse breeding relative to other agricultural enterprises, employment, other expenditures, and income by source and activity. Industry changes which have affected activity and return such as changes in structure, state regulation and introduction of new breeds, will be included. Some data collection and analysis will be based on the national economic analysis of racing and breeding underway in order that relevant national data may be incorporated. Analysis will primarily require standard statistical procedures.

Horse Hoof Characteristics, their Control and Modification for Functional Durability

Investigator: E. C. Leffel
Start: July 1972
Terminate: June 1974

Accession Number: 080
Location: University of Maryland
College Park, Maryland 20742

Objectives:

Characterize horse hoof abrasive resistance, resilience, shear strength, density, color, moisture content and possible interrelationships between these factors. Determine the effect of the periole in maintaining hoof

health and functional durability. Test effects of hoof dressings on maintenance and function of the hoof. Reduce the cost of hoof care and improve horse hoof health.

Approach:

Initial work will be to determine characteristics, normal ranges, and variations in moisture levels, density, resistance to abrasion, resilience, shear strength, etc. The nature of the periople or outside surface of the hoof will be explored, regarding permeability to water, air, oils, etc. and effect on water retention by the foot. Moisture measurements will be made at various depths from the periople and from the sole surface. Moisture readings will be obtained by inserting a hygrometer probe into previously drilled holes in the horse foot and reading electrical inductive resistance prevailing at various time intervals and at various locations. Similarly, moisture loss to the outside of the hoof will be measured. Environmental temperature relative humidity will be considered. As techniques are tested and established, additional tests will be made such as effects of destroying the periople, applications of commercially popular hoof dressings, and experimental hoof dressings.

Studies of Parasite Control in the Equine Gastrointestinal Tract

Investigator:	J. P. McCall	Accession Number:	081
Start:	July 1972	Location:	University of Maryland
Terminate:	June 1974		College Park, Maryland 20742

Objectives:

Investigate the efficiency of different methods of administration of anthelmintics. Develop a pattern of parasite control applicable in the central Maryland region.

Approach:

Ten light horses are to be observed under stabled conditions for transmission patterns of internal parasites. Five horses will receive the anthelmintic dosage by tube and fill will receive the anthelmintic by feeding. The anthelmintics will be Thiobendazole, Piperazine and Carbon Disulfide.

Evaluation of Experimental Vaccines in Laboratory Animals in Biological Warfare Defense Research

Investigator:	R. O. Spertzel	Accession Number:	082
Start:	July 1971	Location:	U.S. Army Animal Assessment
Terminate:	June 1972		Division
			Fort Detrick
			Frederick, Maryland 21701

Objectives:

Evaluate experimental vaccines in laboratory and other animals before use in man. Assist in control of an epizootic. This work unit is an essential element in a comprehensive program for defense against BW agents.

Approach:

Vaccines will be given to laboratory animals and will be otherwise safety tested prior to administration to man. Vaccine and technical assistance will be supplied to conduct a vaccination program. The program is intended to create a barrier of immune horses and thereby curb the spread of Venezuelan Equine Encephalitis in these animals.

Michigan

Meclofenamic Acid Excretion Study in the Equine Species

Investigator:	G. H. Conner	Accession Number:	083
Start:	October 1972	Location:	College of Veterinary Med.
Terminate:	Indefinite		Mich. State University
			East Lansing, Michigan 48823

A Study to Observe Effects of Cl-583 on Normal Synovial Fluid of Horses

Investigator:	C. H. Conner	Accession Number:	084
Start:	September 12, 1972	Location:	College of Veterinary Med.
Terminate:	Indefinite		Michigan State University
			East Lansing, Michigan 48823

A Laboratory Study of the Amount of Cl-583 in Selected Tissues and Body Fluids at Various Times After Administration to the Horse

Investigator:	C. H. Conner	Accession Number:	085
Start:	January 10, 1972	Location:	College of Veterinary Med.
Terminate:	Indefinite		Mich. State University
			East Lansing, Michigan 48823

A Laboratory Study of the Effects of NEO-ARTH on Synovial Fluid in the Arthritic Horse

Investigator:	C. H. Conner	Accession Number:	086
Start:	October 1, 1971	Location:	College of Veterinary Med.
Terminate:	September 30, 1972		Mich. State University
			East Lansing, Michigan 48823

Controlled Study in the Equine to Determine the Efficacy of Selected Doses of RS-3540 in Myositis

Investigator:	W. F. Riley	Accession Number:	087
Start:	July 1, 1972	Location:	College of Veterinary Med.
Terminate:	November 15, 1972		Mich. State University
			East Lansing, Michigan 48823

A Study of Effects of Meclofenamic Acid on Synovial Fluid
Extracted from Arthritic Joints of Horses

Investigator:	G. H. Conner	Accession Number:	088
Start:	August 1971	Location:	Col. of Veterinary Med. Mich. State Univ. East Lansing, Mich. 48823
Terminate:	Indefinite		

The Efficacy of Meclofenamic Acid in Clinical Cases of Equine Laminitis

Investigator:	W. F. Riley	Accession Number:	089
Start:	March 1972	Location:	Col. of Veterinary Med. Mich. State Univ. East Lansing, Mich. 48823
Terminate:	Indefinite		

Hormonal Control of Ovulation in Animals

Investigator:	W. R. Dukelow	Accession Number:	090
Start:	January 1958	Location:	Michigan State University East Lansing, Mich. 48823
Terminate:	June 1975		

Objectives:

Develop a technique for controlling ovulation in animals. Use this to determine capacitation and fertilization time and allow a high rate of implantation and minimum of embryonic death.

Approach:

Initial efforts will involve adaptation of laparoscopic techniques to farm animals for visualizing ovulation. Then, estrus will be synchronized with progestins and various regimes of FSH and HCG employed to induce ovulation. Blood levels of progesterone, estrogen and gonadotropins will be determined in normal and induced animals. These samples will be taken throughout estrus and to the stage of implantation. Initial work will involve sheep, goats, and horses with later work in cattle and swine. After determination of the time of ovulation, animals will be mated and by this means the time requirement for capacitation can be determined.

Respiratory and Cardiovascular Changes Associated with Surgical
Positioning

Investigator:	D. O. Goble	Accession Number:	091
Start:	July 1, 1972	Location:	Michigan State University East Lansing, Mich. 48823
Terminate:	June 30, 1973		

Peripheral Steroid Hormones During the Estrus Cycle of the Mare

Investigator: W. D. Oxender Accession Number: 092
Start: January 1972 Location: Michigan State University
Terminate: January 1973 East Lansing, Mich. 48823

Objectives:

Quantify serum hormone concentration changes during diestrus, estrus and ovulation in the mare.

Approach:

Serum samples were collected from several mares during the estrus cycle. Behavioral estrus and ovulation were determined for each mare. Progesterone and corticoids are being quantified by competitive-protein binding assays. Estradiol-17B, Estrone and Androstenedione are being quantified by radioimmunoassay methods. Determine what relationship changes in serum hormone concentrations have to estrus and ovulation in the mare.

Cellular and Biochemical Genetics

Investigator: Richard C. Tashian Accession Number: 093
Start: October 1971 Location: University of Michigan
Terminate: September 1972 Ann Arbor, Michigan 48104

Red cell carbonic anhydrases were examined from four primate species: man, chimpanzee (Pan troglodytes), orangutan (Pongo pygmaeus) rhesus macaque (Macaca mulatta), and four ungulate species: horse (Equus caballus), pig (Sus scrofa), sheep (Ovis aries), and ox (Bos taurus). The activities measured were the hydration of CO₂ and the hydrolysis of the ester substrates: β -naphthyl acetate, p-nitrophenyl acetate, and 2-hydroxy-5-nitro-~~4~~-toluenesulfonic acid sultone. The results of these studies showed that all mammalian red cells possess a high specific hydase activity form of carbonic anhydrase, CA II, whose hydase and esterase activities have remained fairly constant in the different species tested.

Minnesota

Nutrition of Horses

Investigator: R. M. Jordan Accession Number: 094
Start: July 1969 Location: University of Minnesota
Terminate: June 1974 St. Paul, Minnesota 55101

Objectives:

Determine the protein, calcium, phosphorus and vitamin A requirements of Shetland ponies from 4 months to 4 years of age for growth, reproduction and lactation. Determine the effect of calcium and phosphorus imbalances on bone development and unsoundnesses.

Approach:

A 2 x 3 factorial designed experiment involving two divergent levels of calcium and phosphorus and three protein levels. Effect of treatment will be determined by growth response, blood studies and radiographs of bone tissue. Bone biopsies will be taken periodically to determine calcium, phosphorus, manganese, magnesium, zinc, copper, cobalt and iron. Macroradiographs of the bone biopsies will be made to study the design of the bone matrix as affected by protein, calcium and phosphorus levels in the rations.

An Investigation of the Mechanisms by which Body Size Influence Basal Metabolism

Investigator: J. D. Smith
Start: June 1967
Terminate: June 1972

Accession Number: 095
Location: University of Minnesota
St. Paul, Minn. 55101

Objectives:

The work in this project is designed to clarify the extent to which muscular tone or activity is involved in the BMR of animals as well as provide information concerning the relationship of body composition and the efficiency of homeostasis maintenance to the BMR.

Approach:

A flow rate respirometer will be constructed and tested against a conventional apparatus. Regression analyses will be used to assess the influence of certain segments of body composition on the BMR of different size animals. Tissue respirometry of similar tissues from different size animals will be used to determine whether cellular maintenance requirements are proportional to cell mass.

Missouri

Laminitis Induction Studies

Investigator: J. R. Coffman
Start: 1972
Terminate: Indefinite

Accession Number: 096
Location: University of Missouri
Columbia, Missouri 65201

Objectives:

To develop a standard technique for producing experimental acute laminitis and to further characterize the response of the equine to E. coli endotoxin.

Doppler Blood Pressure Studies in the Pony

Investigator: H. E. Garner	Accession Number: 097
Start:	Location: University of Missouri
Terminate: June 30, 1973	Columbia, Missouri 65201

Objectives:

To establish an accurate method of measuring arterial blood pressure indirectly in the equine species and to characterize equine diseases with indirect blood pressure measurements.

Trace Amount Substances in Environmental Health

Investigator: Carl J. Marienfeld	Accession Number: 098
Start: January 1971	Location: University of Missouri
Terminate: September 1972	Route 4, Columbia, Missouri 65201

Objectives and Approach:

Trace elements are being measured at the University of Missouri. Water Analysis for trace elements is being conducted in a high rate county. Analysis for organic substances in water will be conducted by the carbon absorption technique. Annual "Tree Ring Trace Element Analysis" is being conducted using elemental lead as the test substance. Forage and vegetable analysis is being conducted for lead in the old lead belt area. Lead fatalities in horses in this lead belt area are being studied.

Vitamin K in Animal Tissue

Investigator: John T. Matschiner	Accession Number: 099
Start: September 1971	Location: St. Louis University
Terminate: August 1973	221 N. Grand St. Louis, Missouri 63103

Objectives and Approach:

Direct examination of the liver of several species of animals for the occurrence of vitamin K will continue. These studies are being conducted with large scale extraction and chromatographic equipment and will eventually conclude with the characterization of vitamin K from beef, horse, pig, and dog liver. Results obtained thus far support the view that liver contains mainly that vitamin K which is absorbed from the gut and does not, principally at least, contain metabolic forms of the vitamin. Associated studies are underway to determine metabolic forms of vitamin K which do occur in animal tissue and to ascertain possible biological activity of these compounds.

Mode of Action of Fat-Soluble Vitamins in Rats, Chickens, Cattle,
and Horses

Investigator: Robert E. Olson
Terminate: 1972 indefinite

Accession Number: 100
Location: St. Louis University
1402 South Grand Boulevard
St. Louis, Missouri 63104

Objectives:

Test a unifying hypothesis for the action of fat-soluble vitamins as regulators of protein synthesis in higher mammals.

Approach:

Studies currently in progress deal with the metabolism and actions of vitamins K and E.

Prothrombins from rat and chick plasma have been purified and N-terminal amino acids and fingerprints are being determined. Prothrombins are also being used as antigens to develop antisera as a reagent for detection of small amounts of these prothrombins in isolated studies of protein synthesis. Cell-free systems have been constructed for the biosynthesis of prothrombin. The regulatory protein which binds vitamin K and the coumarin drugs at allosteric sites is being sought by studies of binding radioactive coumarin and vitamin K₁. It is believed that a special protein serves as an initiation factor for prothrombin biosynthesis in the mammal. Experiments are in progress to validate this hypothesis.

The Effect of Exercise on Depth of Penetration by Fine Micron Size
Particles into the Equine Lung

Investigator: P. E. Phillips
Terminate: June 30, 1972

Accession Number: 101
Location: University of Missouri
Columbia, Missouri 65201

Montana

Control of Insects Affecting Montana Livestock

Investigator: D. K. Scharff
Start: July 1969
Terminate: July 1974

Accession Number: 102
Location: Montana State University
Bozeman, Montana 59715

Objectives:

Study face flies with emphasis on the improvement of natural and artificial control. Determine vat-life of systemic insecticides and the feasibility of using smaller vats. Evaluate safety and effectiveness of pour-on insecticides for warble control in horses. Seek effective and safe methods for lice control on "carrier" cattle. Conduct control studies on other livestock insect pests.

Approach:

Collect face flies in their natural habitats, and evaluate the success of parasitic beetles as biological control agents. Evaluate the effectiveness of native nematode parasites. Study life history and ecology of face flies and parasites. Test and evaluate possible face fly control methods and materials. Fill vats with effective insecticides and collect and analyze samples at intervals to determine insecticide longevity. Treat horses with pour-on warble-control insecticides and evaluate their safety and effectiveness. Treat cooperator "lice carriers" with different insecticides and methods to develop effective, lasting control. Evaluate control methods for other livestock insects as these problems arise, using standard research procedures.

New Jersey

Mosquitoes in Relation to Agricultural Production and Veterinary Science

Investigator:	D. M. Jobbins	Accession Number:	103
Start:	August 1956	Location:	Rutgers University
Terminate:	December 1972		New Brunswick, N.J. 08903

Objectives:

Evaluate possible adverse effects of mosquitoes on the production of meat, milk and animal products and develop procedures for reducing economic loss. Evaluate the effects of mosquitoes on management of equines. Evaluate systemic and surface repellents for animals. Characterize the role of mosquitoes in transmission of virus and protozoan diseases of domestic birds and animals and as reservoirs of disease agents.

Approach:

Characterize mosquitoes collected in traps and at resting sites and visually observe their activities in relation to domestic animals. Identify the source of blood found on abdomens of mosquitoes. Collect serum from domestic animals and test them for antibodies to arthropod-borne pathogens. Prepare antigens for use on laboratory procedures.

Equine Nutrition Research

Investigator:	G. W. Vandernoot	Accession Number:	104
Start:	July 1963	Location:	Rutgers University
Terminate:	June 1973		New Brunswick, N.J. 08903

Objectives:

Study the nutritive value and metabolism of forages commonly fed to horses. Develop and evaluate techniques for conducting equine nutrition research.

Approach:

Metabolism studies will be conducted with mature horses maintained on barn-cured forages grown in New Jersey. Digestion coefficients of the various components of the forages and the nitrogen balance will be determined. The concentrations of carotene, vitamin A, phosphorus and

calcium in the blood will be compared to the amount of carotene, phosphorus and calcium fed in the forages. New research techniques applicable to horses will be developed and evaluated. Criteria for measuring the response of mature light horses to differing nutritional regimes will be studied.

Determination of Protein Requirements for Mature Geldings

Investigator:	G. W. Vandernoot	Accession Number:	105
Start:	April 1969	Location:	Rutgers University
Terminate:	June 1973		New Brunswick, New Jersey 08903

Objectives:

Develop semi-purified diet for horses using National Research Council standards as guide for protein, energy, vitamins, and minerals for matured geldings weighing about 432kg. Determine metabolic fecal and endogenous urinary nitrogen. Determine minimum protein requirements for maintenance and evaluate the effect of exercise. Apply results of studies on the protein requirements of horses to both maintenance and to various levels of exercise. Typical diets consisting of hay and grain will be used as controls.

Approach:

Four mature geldings of equal weight will be used for the duration of study. There will be a series of 9 metabolism trials to evaluate protein requirements. Semi-purified diet will be identical in all nutrients, minerals, and vitamins, except for protein. There will be a second series of metabolism trials to evaluate effects of exercise on protein requirements. Horses will be fed the maintenance protein requirement determined in previous experiments.

New York

Pulmonary Deposition and Clearance of Dust in Man

Investigator:	R. E. Albert	Accession Number:	106
Start:	May 1971	Location:	School of Medicine
Terminate:	April 1972		New York University
			550 First Avenue
			New York, N.Y. 10016

Objectives:

Characterize deposition and clearance of dust in the respiratory tract of healthy humans and donkeys, and determine the effects of various types of lung disease and impairment on these processes.

Approach:

Experiments are being performed to characterize the physical and physiological parameters which control dust deposition in man for both nose and mouth breathing. The dynamics of normal and bronchial clearance are being investigated in both humans and donkeys. The clearance abnormalities observed in man will be compared with those which can be produced in donkeys following the inhalation of cigarette smoke and irritant gases.

Immunochemical Studies on Equine Antibodies

Investigator:	Peter Z. Allen	Accession Number:	107
Start:	January 1972	Location:	School of Medicine and Dentistry
Terminate:	December 1972		University of Rochester Rochester, New York 14620

Objectives and Approach:

The objectives of this study are the isolation, purification and characterization of immunoglobulins from various equine species. Antibodies have been produced in the horse to human IgG and type specific pneumococcal capsular polysaccharides. A chemical, physicochemical and immunological comparison of these horse immunoglobulins is being carried out for comparison with other equine species.

Electron Microscopy of Food-and-mouth Disease Virus and Other Exotic Animal Viruses

Investigator:	S. S. Breese, Jr.	Accession Number:	108
Start:	October 1968	Location:	Plum Island Animal Disease Lab
Terminate:	December 1972		USDA P.O. Box 848 Plum Island, New York 11944

Objectives:

Characterize the interaction of viruses with cells, the attachment of viruses, and their entry, morphogenesis, and release in the presence and absence of chemotherapeutic agents. Identify new exotic animal viruses and more completely characterize previously visualized viruses.

Approach:

Use electron microscopic and other biophysical methods to visually elucidate the interaction of virus and cell. Ferritin tagged antibody, autoradiography, and chemical inhibitors of nucleic acid and protein formation will be used to define morphogenesis.

Equine Infectious Anemia

Investigator:	L. Coggins	Accession Number:	109
Start:	April 1, 1972	Location:	School of Veterinary Med.
Terminate:	March 31, 1973		State University of New York Ithaca, New York 14850

Objectives:

Develop an accurate, quick and inexpensive serological or other test or diagnostic procedure for the detection of Equine Infectious Anemia virus in horses. Develop a biological agent which would produce a degree of protection or immunity against this virus in a healthy horse.

A Study of Equine Infectious Disease

Investigator: L. Coggins Accession Number: 110
Start: January 1, 1972 Location: School of Veterinary Med.
Terminate: December 31, 1972 State University of New York
 Ithaca, New York 14850

Objectives:

Study the prevalence of Equine Infectious Anemia in horses and the mechanisms of transmission of EIA virus.

Equine Infectious Diseases

Investigator: L. Coggins Accession Number: 111
Start: April 1, 1972 Location: School of Veterinary Med.
Terminate: March 31, 1973 State University of New York
 Ithaca, New York 14850

Objectives and Approach:

Investigate etiological agents of Equine Infectious Anemia and respiratory infections of the horse. Develop diagnostic tests, means of prevention, and vaccines for immunization.

Dosage Phenomena in Sex-linked and Autosomal Variants

Investigator: Ronald G. Davidson Accession Number: 112
Terminate: Indefinite Location: Children's Hospital
 219 Bryant Street
 Buffalo, New York 14222

Objectives and Approach:

Data bearing on the X-inactivation theory or Lyon hypothesis have been derived from diverse experimental systems, each yielding only partial proof. Our studies to obtain simultaneous biochemical and cytological data within a single experimental system have been partially completed and published (Proc. Nat. Acad. Sci. 68:544 1971). The studies will continue. These studies have utilized the female mule, a natural hybrid in which the paternal (donkey) and maternal (horse) X-chromosomes are morphologically distinct. Electrophoresis of X-linked glucose-6-phosphate dehydrogenase yielded a multiple band pattern in which each component was identifiable. In the cell cultures of the four animals studied, a majority of cells showed a late replicating donkey X-chromosome with a resulting ratio deviating significantly from that expected from random inactivation. Quantitation revealed a preponderance of horse type enzyme closely paralleling the cytological findings.

Biology and Control of Ectoparasites and Flies Affecting Livestock and Poultry

Investigator: J. G. Matthyse Accession Number: 113
Start: September 1969 Location: Cornell University
Terminate: June 1974 Ithaca, New York 14850

Objectives:

Develop most effective, least expensive, and least contaminating materials and methods for controlling arthropod pests of livestock and poultry.

Approach:

Acquire basic information on the biology of lice, mites, ticks, grubs, house-flies, face flies and blood sucking flies that parasitize and annoy cattle, sheep, goats, swine, horses and poultry.

Equine Drug Research Program

Investigator: S. Nusbaum

Accession Number: 114

Start: April 1, 1972

Location: Diagnostic Laboratory

Terminate: March 31, 1973

N.Y State Veterinary College

Ithaca, New York 14850

Objectives and Approach:

Investigate methods for detection of drugs that might be used as stimulants or depressants in race horses. Study the metabolism, modes of action, and excretion of these drugs.

Taxonomic, Biological and Distributional
Studies on Horse Flies and Deer Flies

Investigator: L. L. Pechuman

Accession Number: 115

Start: April 1970

Location: Cornell University

Terminate: March 1975

Ithaca, New York 14850

Objectives:

Use morphological and behavioral characters of adult and immature Tabanidae to characterize relationships among species. Establish distributional patterns of the various species.

Approach:

Adult Tabanidae will be collected utilizing various methods. Immature forms will be collected by screening mud in breeding areas. Adults will be studied in the laboratory. Ecological and behavioral observations will be recorded and evaluated.

Chemical Composition of Living Animals

Investigator: J. Thomas Reid

Accession Number: 116

Start: January 1972

Location: Cornell University

Terminate: December 1973

Ithaca, New York 14850

Objectives:

Quantify and systematize the gross chemical composition and energy value of the body of animals of various species.

Approach:

During 1972, the pony was studied for the first time and additional data were obtained with the rat, guinea pig, sheep, and bovine.

The whole bodies of 11 ponies ranging in age from 8 mos. to 18 years and including mares, stallions and geldings were analyzed chemically. However,

the population of ponies studied to date is too small and heterogenous for comparison with other species. Therefore the studies are to continue toward the achievement of stated objectives.

Nutrient Requirements of the Light Horse

Investigator:	H. F. Hintz	Accession Number:	117
Start:	July 1970	Location:	Cornell University
Terminate:	July 1973		Ithaca, New York 14850

Objectives:

Study factors affecting nutritional requirements of horses and attempt to better define these requirements. Emphasis will be placed on requirements of calcium, phosphorus and protein because of their relationship to skeletal development. The availability of calcium and phosphorus will be studied.

Approach:

Calcium and phosphorus requirements and metabolism will be studied with combined balance and kinetic trials with the use of radioisotopes. Data from these trials will include total mineral retained, endogenous or obligatory losses in urine and feces which can be used to estimate maintenance requirements, estimates of bone accretion and resorption rates and true availability of calcium and phosphorus. Calcium and phosphorus requirements for growth are being studied in feeding trials with young foals. Protein and amino acid requirements will be estimated with feeding trials and nitrogen balance trials. The contributions of the microflora of the lower gut to the nitrogen pool will be estimated in ponies fitted with re-entrant intestinal cannulas and catheterized portal veins.

Structure and Function in Butyrylcholinesterase

Investigator:	D. J. Kosman	Accession Number:	118
Start:	February 1972	Location:	School of Medicine
Terminate:	January 1974		State University of New York
			3435 Main Street
			Buffalo, New York 14214

Objectives and Approach:

The function of butyrylcholinesterase in horse serum is to be determined. Experimental goals of the research are: 1) a kinetic analysis of the hydrolysis of substrate esters catalyzed by this enzyme, 2) inhibition and derivatization of the enzyme by specific chemical reagents to locate these chemicals within the enzyme, and 3) to establish the chemical and structural relationship between the various functional loci within the enzyme molecule. The information thus generated will be used to answer these general and specific questions: 1) What is the structure-function relationship between the serine proteinases and esterases; 2) What is the kinetic mechanism for ester hydrolysis by a cholinesterase; 3) What are the functional amino acid residues which participate in binding and catalytic events and how are they spatially disposed; 4) What is the structural relationship between effector and depressor binding sites and the substrate binding and catalytic site;

and 5) What can be deduced about the nature and origin of isoenzymic cholinesterases from a complete description of the functional operation of butyrylcholinesterase from horse serum.

Conformation Studies on Modified Hemoglobins

Investigator:	S. R. Simon	Accession Number:	119
Start:	September 1971	Location:	School of Arts
Terminate:	August 1972		State University of New York Stony Brook, New York 11790

Objectives:

Characterize cooperative interactions, changes in values of linked functions, and conformational rearrangement normally associated with binding and release of oxygen to hemoglobin.

Approach:

Modify the native hemoglobin molecule with bifunctional reagents which freeze horse hemoglobin into a conformation identical to that of the normal oxy-protein, even when deoxygenated. The induced conformational constrain has been demonstrated in crystals by X-ray diffraction methods, and in solution by circular dichroism and temperature-jump methods. We propose a series of additional modification studies to establish the mechanism whereby the normal ligand-linked conformational changes are eliminated. The properties of the altered proteins will be related to those of the native hemoglobin molecule to identify additional interactions among specific amino acids which are critical for normal physiological function.

Equine Research

Investigator:	H. F. Schryver	Accession Number:	120
Start:	April 1, 1972	Location:	School of Veterinary Med.
Terminate:	March 31, 1973		State University of New York Ithaca, New York 14850

Objectives and Approach:

Study bone and joint diseases of the horse. The major projects are in skeletal physiology and metabolism, mineral metabolism and nutrition, clinical and surgical research, and in digestive physiology of the horse.

Gastrointestinal Absorption in the Herbivore

Investigator:	C. E. Stevens	Accession Number:	121
Start:	January 1972	Location:	School of Veterinary Medicine
Terminate:	December 1972		State University of New York Ithaca, New York 14850

Objectives and Approach:

Study of microbial digestion in the large intestine of "simple-stomached" herbivores such as the pony, rabbit, guinea pig and rat. The patterns of digesta flow and volatile fatty acid distribution will be studied by injection of liquid and particulate digesta markers at various points along the

digestive tract and then determining distribution at given period of time following the feeding of a common diet. The rate of volatile fatty acid transport across the lining of the large intestine will also be studied.

Ohio

Pathophysiology of Coal Pneumoconiosis in Equidae

Investigator: G. W. Davis
Start: June 1972
Terminate: May 1973

Accession Number: 122
Location: School of Veterinary Medicine
Ohio State University
102 Administration Bldg.
Columbus, Ohio 43210

Objectives and Approach:

Study coal penumoconiosis or "black-lung disease" in coal-mine ponies. The aim is to complete intensive comparative studies on selected aspects of coal pneumoconiosis and associated diseases. Studies completed or in progress are to characterize the pulmonary and cariovascular changes in equidae spontaneously exposed to coal mine dust, characterize pathological changes, and correlate the findings with the results of similar studies in man.

Weak Interactions Between Biological Macromolecules

Investigator: J. A. Harpst
Start: June 1972
Terminate: May 1973

Accession Number: 123
Location: School of Medicine
Case Western Reserve Univ.
2109 Adelbert Road
Cleveland, Ohio 44106

Objectives and Approach:

Use low angle light scattering techniques to study the kinetics of denaturation of deoxyribonucleic acid (DNA). Related work will be directed toward characterizing the high molecular weight DNA by light scattering, sedimentation, and viscosity measurements. Physico-chemical methods will be used to study solution properties of the large enzyme butyryl-cholinesterase, obtained from horse serum. In addition to providing some fundamental physical measurements, the work is expected to correlate subunit structure with biological activity. The structural and biological effects of interactions between DNA and protein will be investigated with several hydrodynamic and biological techniques and by electron microscopy. A particulate fraction, derived from T2 bacteriophage by treatment with area or by osmotic shock, will be used in an effort to determine the effects of proteins associated with DNA on infectivity and on the structure of the particles. This investigation is expected to provide fundamental information on the nature of macromolecular interactions and the ways in which such interactions participate in the structural and functional organization of living systems.

Biology of the Heart

Investigator: David L. Smetzer
Start: June 1971
Terminate: May 1973

Accession Number: 124
Location: Ohio State University Hospital
410 West 10th Avenue
Columbus, Ohio 43210

Objectives and Approach:

Study the cellular biology and the organ biology of the heart. Microstructure will be correlated with function. The reaction of heart muscle to injury, the biochemical control of energy release in the myocardium, and the maintenance of ion homeostasis in heart muscle will be studied.

Investigation of Certain Aspects of Nutrition in the Equine

Investigator: W. J. Tyznik
Start: June 1967
Terminate: July 1972

Accession Number: 125
Location: Ohio State University
Columbus, Ohio 43210

Objectives:

Study the efficiency of utilization of cellulose by the horse. Study the synthesis and absorption of volatile fatty acids and B-complex vitamins in the cecum and colon of the horse. Investigate the feasibility of utilizing laboratory techniques in studying various digestive aspects. Investigate the possible metabolism and efficiency of different nitrogen sources in the horse.

Approach:

Fistulated ponies will be used to study cellulose digestion by a nylon bag technique and will also be used as a source of inoculum for in vitro cellulose digestion. Radioactive thiamine will be used to study absorption, distribution and excretion. Nitrogen balance studies will be made with the fistulated animals.

Oklahoma

Biology, Ecology, and Control of the Lone Star Tick

Investigator: J. A. Hair
Start: June 1971
Terminate: June 1973

Accession Number: 126
Location: Agricultural Experiment
Station
Oklahoma State University
Stillwater, Oklahoma 74074

Objectives:

Determine the movements of ticks and the role of migration in tick aggregation. Establish the relationship between vegetation and potential means of tick control. Develop and demonstrate the effects of new insecticide controls.

Approach:

Field observations will be made to determine the migratory behavior and the possible role of pheromones or other stimuli in aggregation behavior.

Removal or substitution of various ground covers or disturbing the soil will be explored as possible means of control. Area treatments will be made with potential toxicants to determine their efficacy.

Oregon

Biological Methods of Control for Internal Parasites of Livestock

Investigator:	S. E. Knapp	Accession Number:	127
Start:	January 1970	Location:	Oregon State University
Terminate:	July 1973		Corvallis, Oregon 97331

Objectives:

Discover principles and develop applications of immunity to internal parasites in domestic animals.

Approach:

Study the possible use of microsporidia as a means for control of liver flukes and its lymnaeid snail intermediate hosts. Evaluate, under field conditions, the effectiveness and practicability of various parasite control recommendations.

Pennsylvania

Atrial Fibrillation in the Horse

Investigator:	F. G. Fregin	Accession Number:	128
Start:	1972	Location:	School of Veterinary Medicine
Terminate:	Indefinite		University of Pennsylvania
			Philadelphia, Pa. 19104

Objectives:

Study the etiology, pathophysiology, and treatment of atrial fibrillation in large animals.

Approach:

Information to date has been accumulated on 60 horses with this arrhythmia. Studies have included cardiac catheterization, electrocardiography, phonocardiography, and response to exercise. Numerous antiarrhythmic drugs, autonomic blocking agents and electrical reversion are being evaluated.

Autonomic Effects on the Electrocardiogram of the Normal Horse at Rest and with Exercise

Investigator:	F. G. Fregin	Accession Number:	129
Start:	1972	Location:	School of Veterinary Medicine
Terminate:	May 1973		University of Pennsylvania
			Philadelphia, Pa. 19104

Objective:

Interpret the so-called non-specific repolarization phase changes (i.e. ST segment and T wave) that occur naturally in horses when clinical evidence of cardiovascular disease is lacking.

Equine Research Projects

Investigator: V. Ganjam
Start: June 1972
Terminate: June 1976

Accession Number: 130
Location: School of Veterinary Medicine
University of Pennsylvania
Philadelphia, Pa. 19104

Objectives:

Characterize progesterone metabolism in the pregnant and non-pregnant mare, androgen metabolism in the stallion and its relation to semen quality, the role of the adrenal cortex during parturition in the mare, the effect of various diluents and seminal plasma on the longevity of sperm in the stallion, the immune mechanisms involved in uterine infections of the mare and their interplay with various endocrinological events, and the interrelationship of sex-steroid hormones and learning in the control of sexual behavior.

Muscle Glycogen Response to Exercise and Diet in the Equine

Investigator: E. Hammel
Start: September 1968
Terminate: Indefinite

Accession Number: 131
Location: School of Veterinary Medicine
University of Pennsylvania
Philadelphia, Pa. 19104

Objectives:

Study the effects of degree of fitness, type of exercise, exhaustion, and high carbohydrate diet on muscle glycogen levels. Attempt to determine the etiology of exertional myoglobinuria in the horse.

Stability of Equine Total Serum Lactate Dehydrogenase and Isoenzymes with Various Storage Methods

Investigator: E. Hammel
Start: March 1971
Terminate: November 1972

Accession Number: 132
Location: School of Veterinary Medicine
University of Pennsylvania
Philadelphia, Pa. 19104

Objectives and Approach:

Determine the optional method of storing equine serum for lactate dehydrogenase assay. The effects of room temperature, refrigerator, deep freeze and liquid nitrogen storage are being studied. Both total serum levels and isoenzyme electrophoretic separations are being used to evaluate the effects of short- and long-term storage.

Utilization of Preprotein by Equine

Investigator: T. V. Hershberger
Start: July 1970
Terminate: June 1973

Accession Number: 133
Location: Pennsylvania State University
University Park, Penn. 16802

Objectives:

Evaluate the effect of protein quality on nitrogen retention by equine as influenced by ration density.

Approach:

Mature, cecal-cannulated horses in metabolism stalls will be fed semi-synthetic rations formulated to meet all NRC requirements except protein. Crude protein supplements will be supplied orally or intracecally to meet NRC requirements. The nonprotein portion of the ration will be pelleted and will be either high in cellulose or high in starch. Digestible energy, metabolizable energy and nitrogen balance will be determined on each of twelve rations. Rate of absorption of amino acids from the gut will be estimated by determining flow and concentration of amino acids in the portal vein at various times after feeding.

Myotonia in the Horse

Investigator: A. Kelly
Start: April 1971
Terminate: Indefinite

Accession Number: 134
Location: School of Veterinary Medicine
University of Pennsylvania
Philadelphia, Pa. 19104

Objective:

Characterize myotonia in the horse and investigate electrical, chemical and physical properties of the diseased muscle cells.

Physiological Shunting in the Horse

Investigator: L. Klein
Start: August 1972
Terminate: August 1973

Accession Number: 135
Location: School of Veterinary Medicine
University of Pennsylvania
Philadelphia, Pa. 19104

Objective:

Determine changes in physiological shunting in the awake and anesthetized horse.

A Comparison of Rompun with Phenothiazine Tranquilizers
for Preanesthesia Medication in the Horse

Investigator: L. Klein
Start: November 1972
Terminate: November 1973

Accession Number: 136
Location: School of Veterinary Medicine
University of Pennsylvania
Philadelphia, Pa. 19104

Objective:

Determine if Rompun is different from usual phenothiazine tranquilizers used for preanesthetic medication in the horse.

Central Venous Pressure Measurements in the Horse

Investigator:	L. Klein	Accession Number:	137
Start:	October 1972	Location:	School of Veterinary Medicine
Terminate:	October 1973		University of Pennsylvania
			Philadelphia, Pa. 19104

Objective:

Determine the normal central venous pressure in the standing awake horse and in the anesthetized horse in lateral and dorsal recumbency.

Studies on Leukemia in the Horse

Investigator:	R. R. Marshak	Accession Number:	138
Start:	1972	Location:	School of Veterinary Medicine
Terminate:	1975		University of Pennsylvania
			Philadelphia, Pa. 19104

Objective:

Determine if equine leukemia is induced by a virus. If this proves to be the case, characterize the virus and define virus-tumor and host-tumor relationships.

Equine Influenza

Investigator:	J. S. Reif	Accession Number:	139
Start:	1972	Location:	School of Veterinary Medicine
Terminate:	Indefinite		University of Pennsylvania
			Philadelphia, Pa. 19104

Objective:

Study influenzas that attack the equine species as well as other species.

Pathophysiology of Chronic Diarrhea in the Horse

Investigator:	A. M. Merritt	Accession Number:	140
Start:	September 1, 1972	Location:	School of Veterinary Medicine
Terminate:	June 30, 1975		University of Pennsylvania
			Philadelphia, Pa. 19104

Objective:

Define the location and nature of intestinal malfunction in the horse which result in the chronic diarrhea syndrome.

Diffuse Intravascular Coagulation in the Horse

Investigator:	W. Moyer	Accession Number:	141
Start:	June 1972	Location:	School of Veterinary Medicine
Terminate:	Indefinite		University of Pennsylvania
			Philadelphia, Pa. 19104

Objective:

Define diffuse intravascular coagulation in the horse clinically and by laboratory methods.

Streptococcus Equi in Foals

Investigator: H. Lewis
Start: 1972
Terminate: Indefinite

Accession Number: 142
Location: School of Veterinary Medicine
University of Pennsylvania
Philadelphia, Pa. 19104

Objective:

Develop a simple diagnostic test for streptococcus equi infection in foals.

Equine Infectious Anemia

Investigator: J. S. Reif
Start: July 1, 1972
Terminate: June 30, 1973

Accession Number: 143
Location: School of Veterinary Medicine
University of Pennsylvania
Philadelphia, Pa. 19104

Objectives:

Not provided.

Equine Pathology

Investigator: J. R. Rooney
Start: 1972
Terminate: 1973

Accession Number: 144
Location: School of Veterinary Medicine
University of Pennsylvania
Philadelphia, Pa. 19104

Objective:

Prepare a book for horsemen on the causes of lameness in horses.

Rhode Island

Infectious Equine Diseases in Rhode Island

Investigator: M. E. Kimball	Accession Number: 145
Start: September 1971	Location: University of Rhode Island
Terminate: June 1974	Kingston, Rhode Island 02881

Objectives:

Study the pleasure horse population for serological evidence of contact with various infectious diseases. Intensively study possible inter-relationships involving human, avian and equine influenza a virus. Prepare a reference pool of equine serum for encephalitis monitoring.

Approach:

Horse blood will be collected from the general population which is primarily imported from other states. The serum will be tested to determine prevalent horse diseases. Results will indicate the direction of further research. Possible changes in equine influenza antigens will be sought whereby new human or avian influenza strains might emerge.

SOUTH DAKOTA

Venezuelan Equine Encephalitis in Waterfowl and Vectors

Investigator: G. C. Parikh	Accession Number: 146
Start: January 1, 1972	Location: South Dakota State University
Terminate: December 31, 1972	Brookings, South Dakota 57006

Objective:

Conduct surveillance in animals and birds on the possible prevalence of VEE in South Dakota by (1) providing a sentinel system for early detection, should VEE enter the State; (2) providing data on possible VEE in migratory waterfowl; (3) providing baseline data for VEE antibodies in animals and waterfowl, and by (4) utilizing the facilities for arboviral studies at South Dakota State University.

Approach:

Conduct a serologic and virologic survey of possible VEE in South Dakota animals and birds, especially horses and waterfowl.

Tennessee

Energy Requirement of Working and Non-working Ponies

Investigator: K. M. Barth	Accession Number: 147
Start: July 1971	Location: University of Tennessee
Terminate: July 1973	Knoxville, Tennessee 37916

Objectives:

Determine total digestible nutrient and digestible energy in rations and calculate the energy requirements for working and non-working ponies.

Approach:

Four Shetland pony stallions will be used in a total-collection digestion trial, employing 10-day preliminary periods. 7-day collection periods, and a switchback design. Two rations will be compared, one maintaining non-working ponies and the other maintaining ponies at medium work at a constant body weight for more than one year. Nutrient and energy digestion coefficients, total digestible nutrients and digestible energy will be determined. Energy requirements for working and non-working ponies will be calculated from digestion and feed intake data.

Late Effects of Whole-Body Gamma and Mixed Neutron-Gamma Radiation on Large Animals

Investigator: D. G. Brown
Start: July 1971
Terminate: June 1972

Accession Number: 148
Location: University of Tennessee
U.T. A.E.C. Agric. Res. Lab.
1299 Bethel Valley Road
Oak Ridge, Tennessee 37830

Objectives and Approach:

Determine the late effects of irradiation on large, long-lived animals with the expectation that the data will be useful in estimating late effects on irradiation on man. Data pertaining to late effects of irradiation on long-lived animals are relatively sparse compared to those from short-lived small laboratory animals thus data from studies such as these are necessary to bridge the gap between short-lived animals and man.

The experimental procedures were designed for detection and evaluation of physio-pathological changes caused by irradiation. A physical examination and tests of the cardiovascular and urinary systems are made on each animal semiannually.

Late Effects of Whole-Body Gamma Irradiation on the Work Performance and Related Physiology of Shetland Ponies

Investigator: D. G. Brown
Start: July 1971
Terminate: June 1972

Accession Number: 149
Location: University of Tennessee
U.T. A.E.C. Agric. Res. Lab.
1299 Bethel Valley Road
Oak Ridge, Tennessee 37830

Objectives and Approach:

Evaluate the physical fitness of Shetland ponies after recovery from early effects of whole-body gamma irradiation. The data from this study will contribute to an estimate of the physical capabilities of man following exposure to ionizing radiation.

The experimental procedure is to subject the ponies to work assignments and measure the physiologic changes which occur while performing a specific work output. The tests are primarily on the cardiovascular system and are similar to the tests used for evaluating physical fitness in man.

Sequential Development of Equine Abortion Virus

Investigator: R. W. Darlington	Accession Number: 150
Start: June 1972	Location: Saint Jude Ch. Res. Hosp.
Terminate: May 1973	332 N. Lauderdale, Box 318 Memphis, Tennessee 38101

Objective and Approach:

Examine the structure and function of the envelope of the herpesvirus which causes equine viral abortion. Determine the origin of antigens with special emphasis on the recently described protein kinase of the viral envelope.

Develop an animal system for the study of latent herpes infections. This model system is potentially important to research on cellular control of latent viral infection.

Mycotoxins and Other Natural Toxicants

Investigator: Benjamin J. Wilson	Accession Number: 151
Start: September 1971	Location: Vanderbilt University
Terminate: August 1976	Vanderbilt Medical Center Nashville, Tennessee 37203

Objectives and Approach:

A disease, known by various names including equine leukoencephalomalacia, has been recognized for several decades in the United States (MacCallum and Buckley, J. Exp. Med. 6: 65, 1905) and throughout the world. It appears to be peculiar to equines. One or more large necrotic lesions develop in the cerebral white matter, often within a fortnight after moldy corn consumption begins.

Studies are now underway to locate the toxic principle in different extracts of funguses. Attempts will be made to purify the mycotoxins in the extracts.

Texas

Feeding the Immature Equine

Investigator: L. H. Breuer	Accession Number: 152
Start:	Location: Texas A & M University
Terminate: August 1975	College Station, Texas 77843

Objectives: Not provided.

Approach: Not provided.

Poorly Understood Livestock Diseases

Investigator: C. H. Bridges	Accession Number: 153
Start: September 1960	Location: Texas A & M University
Terminate: January 1999	College Station, Texas 77843

Objectives:

Determine diseases occurring in livestock in Texas and their relative incidence and significance. Study diseases which are not well defined in order to gain the necessary insight for instigation of projects designed for their diagnosis, prevention, control and possible eradication..

Approach:

Epidemiological and pathological techniques are being employed in diagnosing diseases of economic importance. More intensive studies are being undertaken on certain selected problems.

Venezuelan Equine Encephalitis Foal Study

Investigator: T. L. Bullard	Accession Number: 154
Start: 1971	Location: Texas A & M. University
Terminate: 1972	College Station, Texas 77843

Objectives: Not provided.

Approach: Not provided.

Biology and Control of Grubs and Bots in Livestock and Other Animals in the Southwest

Investigator: R. O. Drummond	Accession Number: 155
Start: May 1966	Location: USDA Livestock Insect Lab.
Terminate: June 1976	Kerrville, Texas 78028

Objectives:

Determine biology, ecology, chemical, biological, and integrated control measures for grubs and bots in the Southwestern U.S. Determine nutrition and habitat requirements of cattle and sheep bots.

Approach:

Evaluate insecticides in laboratory and field studies. Investigate factors of mating, oviposition, and attraction to animals. Rearing media will be chemically defined to achieve greater rearing efficacy. Various glands of the insect will be dissected and subjected to biochemical analysis to determine and differentiate possible attractants. Possible sterilants for these insect species are being investigated. Parasites and predators will be sought.

Venezuelan Equine Encephalitis, Survey
of Vectors and Wildlife

Investigator: J. E. Grimes
Start: 1971
Terminate: 1972

Accession Number: 156
Location: Texas A & M University
College Station, Texas 77843

Objectives: Not provided.

Approach: Not provided.

Physiological Problems in Left Ventricular Bypass

Investigator: Hebbel E. Hoff
Start: May 1972
Terminate: April 1973

Accession Number: 157
Location: Baylor College of Medicine
1200 Moursund Avenue
Houston, Texas 77025

Objectives and Approach:

Study regional blood flow and flow resistance, regional blood volume, effect of gravity on hemodynamics, effect of muscle trauma on hemodynamics, and plasma lysolecithin concentration.

Also study lung compliance, effects of intra arterial injection of potassium chloride on lung volumes, and the oxygen consumption of various organs.

Equine cardiopulmonary dynamics related to anesthesia and operative position will also be investigated.

Studies of Lice, Mites, Ticks, and Fleas Affecting Livestock
and Poultry

Investigator: R. A. Hoffman
Start: February 1972
Terminate: February 1977

Accession Number: 158
Location: Vet. Tox. & Ent. Research Lab.
College Station, Texas 77843

Objectives:

Determine the normal physiology and chemistry of the lice, mites, ticks, and fleas affecting livestock and poultry, and determine the effects or changes produced by selected toxicants, other chemicals or conditions of stress on the arthropod cells, organs and physiological systems.

Approach:

Examine chemically and by pathological techniques normal and treated insects, and the physiological changes which occur in cells, organs, and systems.

Are Recent Venezuelan Equine Encephalitis Outbreaks
in Mexico a Threat to U.S.?

Investigator: R. H. Kokernot
Start: June 1972
Terminate: May 1973

Accession Number: 159
Location: School of Public Health
University of Texas
6515 Freeman, Houston, Tex.
77025

Objectives and Approach:

Determine if Venezuelan equine encephalitis virus in Mexico and more recently (1971) in Texas continues to be a threat to man and horses in the United States.

An intensive field program will be conducted in selected localities to determine if VEE virus has become established and, if so, to attempt to quantify some of the variables involved in chains of transmission. This field activity will involve collection of feral vertebrates and mosquitoes for attempted virus isolation. Sera will be obtained from these vertebrates and selected domestic animals and human beings for survey purposes.

Physiological and Toxicological Studies of Those Flies that
Affect Livestock

Investigator: S.E. Kunz
Start: July 1966
Terminate: December 1976

Accession Number: 160
Location: Vet. Tox. & Ent. Research Lab.
College Station, Texas 77843

Objectives:

Determine the normal physiology of dipterous insects that affect livestock and the effect on the physiology produced by toxicants, sterilants, hormones and other chemicals.

Approach:

Treat individual or groups of insects with selected chemical agents and observe the changes that occur by chemical, pathological, morphological, and genetic techniques. These studies encompass all levels of organism study from the cellular level to gross observations of the insects activity patterns.

Toxicity, Residues, and Metabolism of Chemicals and
Insect Control Agents of Insects Affecting Livestock

Investigator: R. T. Mayer
Start: July 1966
Terminate: December 1976

Accession Number: 161
Location: Texas A & M University
College Station, Texas 77843

Objectives:

Determine toxicity of agricultural chemicals and insect control agents to livestock insects under laboratory and field conditions and establish acute and chronic effects on target and non-target insects. Establish residual activity and levels of parent compounds and metabolites.

Approach:

Treat insects individually or in small numbers by injection, micro-drop, sprays, or exposure to surfaces to establish toxicity. Cooperate with veterinarians and chemists to evaluate effect on animals and to establish chemical residues. Chemical, chromatographic and fluorescent tracer techniques will be commonly used for these determinations.

Role of Domestic Animals in Epidemiology of Venezuelan Equine Encephalitis

Investigator: S. McConnel
Start: May 1972
Terminate: June 1974

Accession Number: 162
Location: Texas A & M University
College Station, Texas 77843

Objectives:

Infect selected species of animals and determine virus titers, persistence of VEE virus, clinical disease, lesions and early antibody response. Relate antibody titers to clinical disease in cattle, sheep, goats, swine and dogs. Measure antibody levels in selected serum samples obtained from cattle, sheep, goats, swine and dogs in known infected areas and in areas where there is no evidence of virus activity in Texas. Conduct auxillary studies in the equidae which will determine possible vaccine virus damage to newborn colts and the duration of maternal antibody in the nursing young.

Approach:

Susceptible cattle, sheep, swine and dogs will be inoculated with VEE virus and monitored for viremia, antibodies and other signs of infection. Sera from various species of animals in infected and non-infected areas of the state will be tested for antibodies to demonstrate distribution of the virus and define the role of domestic animals in persistence of VEE virus.

The Role of Domestic Animals in the Epizootiology of Venezuelan Equine Encephalitis

Investigator: S. D. McConnel
Start: April 1972
Terminate: August 1974

Accession Number: 163
Location: Texas A & M University
College Station, Texas 77843

Objectives:

Determine whether domestic animals, other than the horse, can serve as a reservoir of VEE virus, and gather field data on blood-sucking arthropod feeding activity upon these animals.

Approach:

Domestic animals other than the horse will be inoculated with virulent VEE virus and blood samples will be taken at specified times to ascertain the persistence and level of the subsequent viremia. The species composition and degree of host preference of blood-sucking arthropods will be determined on these animals. Daily, seasonal, and annual fluctuations in the number of arthropods will be recorded.

Venezuelan Equine Encephalitis, Serology Study

Investigator: S. McConnell

Accession Number: 164

Start: 1971

Location: Texas A & M University

Terminate: 1972

College Station, Texas 77843

Objectives: Not provided.

Approach: Not provided.

Venezuelan Equine Encephalitis, Role in Domestic Animals

Investigator: S. McConnell

Accession Number: 165

Start: 1971

Location: Texas A & M University

Terminate: 1972

College Station, Texas 77843

Objectives: Not provided.

Approach: Not provided.

Equine Infectious Anemia

Investigator: R. W. Moore

Accession Number: 166

Start: November 1966

Location: Texas A & M University

Terminate: 1972

College Station, Texas 77843

Objectives:

Refine and evaluate serologic tests for the diagnosis of equine infectious anemia. Develop methods of separation and purification of virus and the abnormal protein which the precipitin test measures. Study the changes provoked by the virus in horse leucocyte cell cultures and in experimentally inoculated horses. Study the immune response in carrier horses and determine the possibility of protecting horses by vaccination.

Approach:

The virus of infectious anemia will be grown in cell cultures and characterized by special strains such as aoridine orange and fluorescent antibodies. Cell culture fluids containing the virus and an abnormal protein produced under the influence of the virus will be fractionated and the fraction identified and characterized. Specific antibody to each traction will be produced in sheep. The specific antibodies produced in response to each fraction will be used to refine serologic tests. The pathogenesis of the disease will be studied in experimentally infected horses.

Diagnosis of Equine Infectious Anemia

Investigator: R. W. Moore
Start: July 1967
Terminate: June 1972

Accession Number: 167
Location: Texas A & M University
College Station, Texas 77843

Objectives:

Improve and evaluate serologic tests for the diagnosis of equine infectious anemia. Develop method of separation and purification of the causative virus. Study the immune response in affected horses.

Approach:

The research is to include development of methods for diagnosis and characterization of the virus. The evolution of diagnostic procedures will include liver biopsy, sideroleukocyte test, serum protein determinations, complement fixation test, hemagglutination test, precipitin test, and virus isolation. Several strains of the virus will be used in the studies. Infected horses in large numbers will be utilized in the studies.

Slow Virus Infection Models-Equine Anemia and Scrapie

Investigator: R. W. Moore
Start: January 1971
Terminate: August 1974

Accession Number: 168
Location: Texas A & M University
College Station, Texas 77843

Objectives:

Study the chemical, physical, serologic and cell culture-virus interaction of the viral agents causing scrapie and equine infectious anemia. Study the virus-host interaction in attempts to determine the nature of the ability for long-term viremia in EIA and the chronicity of the two diseases.

Approach:

The methods to be used on equine infectious anemia will be studies on a continuous passage horse leucocyte culture which is highly susceptible to EIA virus. A nutritional study of these cells will be done to hopefully find the factor or factors in fresh sheep serum that are required to maintain this culture. The effect of chemical agents and antigenic relationships will be studied. Serum neutralization studies will be done on 15 infected horses. Biochemical studies will be done on the viron. The pathogenesis of the disease will be studied using fluorescent antibody against the virus, gamma globulin and on abnormal protein or complex reported previously. The methods to be used on scrapie will be similar to those used on EIA.

Slow Virus Infection Models--Equine Anemia and Scrapie

Investigator: Richard W. Moore	Accession Number: 169
Start: January 1972	Location: Texas A & M University
Terminate: December 1973	Room 101, Vet, Med. Sci. Bldg. College Station, Texas 77843

Objectives:

Study the chemical, physical, serologic and cell culture-virus interaction of the viral agents causing scrapie and equine infectious anemia. Study the virus-horse interaction in attempts to determine the nature of the long term viremia in EIA and the chronicity of the two diseases.

Approach:

Studies will include the use of continuous passage horse leucocyte cultures which are highly susceptible to EIA virus. A nutritional study of these cells will be done to attempt to find the factor or factors in fresh sheep serum that are required to maintain this culture. The effect of chemical agents and antigenic relationships will be studied. Serum neutralization studies will be done on 15 infected horses. Biochemical studies will be done on the viron and a study of the pathogenesis of the disease will be studied using fluorescent antibody against the virus, gamma globulin and on abnormal protein or complex reported previously.

Epidemiology of Venezuelan Equine Encephalitis and Related Arbovirus Diseases

Investigator: J. K. Olson	Accession Number: 170
Start: October 1971	Location: Texas A & M University
Terminate: June 1972	College Station, Texas 77843

Objectives:

Study the epidemiology of Venezuelan Equine Encephalitis and other related viruses.

Approach:

A search of the relevant literature and scientific information repositories will be made. Pilot experiments will be conducted and the data used to design definitive experiments. This information will be incorporated in a concise project outline and a revised Research Resume and Classification of Research.

Epidemiology of Venezuelan Equine Encephalitis and Related Arbovirus Diseases

Investigator: J. K. Olson	Accession Number: 171
Start: February 1972	Location: Texas A & M University
Terminate: June 1975	College Station, Texas 77843

Objectives:

Determine species of known or potential arbovirus vectors and vertebrate hosts present in selected field sites in Texas and northern Mexico. Investigate population dynamics of potential vectors and vertebrate hosts of arbovirus as they relate to the transmission cycles of viruses. Determine the incidence of viruses in populations of blood-sucking arthropods and vertebrates at each geographic site. Determine ability or potential for selected vector-host associations to maintain viruses.

Approach:

Use available sampling techniques to determine species composition and maintain data on a seasonal and annual basis. Determine seasonal and annual fluctuations in population density and distribution for each life stage. Perform arthropod host preference studies in the laboratory and correlate results with those of field experiments. Screen arthropod and vertebrate blood samples collected at each site for arboviruses using appropriate isolation and serological testing methods. Determine the vector-host associations which have the greatest potential for maintaining virus cycles. Perform experimental transmission studies to support these observations.

Control of Reproductive Processes

Investigator: W. C. Foote	Accession Number: 172
Start: July 1972	Location: Utah State University
Terminate: June 1977	Logan, Utah 84332

Objectives:

Study endocrine mechanisms, influence of disease and nutrition, and influence of genetics of reproduction. Study causes, development and pathology of certain musculo-skeletal abnormalities.

Approach:

Endogenous circulating levels of hormones will be measured. Mechanisms will be studied by use of antibodies to hormones and exogenous hormones in cattle and sheep. Cattle will be subjected to phosphorus deficient diets. Genotypes of selected domestic sheep and wild sheep and goats will be defined and combined. Reproductive processes to be studied will include estrus, ovulation, conception, fecundity and prolificacy. Basic mechanisms will be studied that result in abnormal skeletal development and bone remodeling in osteochondrodystrophy in turkeys, osteochondromatosis in horses, and abnormality of the limbs in calves.

Washington

Development of Equine Infectious Anemia Vaccine

Investigator: T. B. Crawford	Accession Number: 173
Start: 1972	Location: School of Veterinary Medicine
Terminate: 1973	Washington State University
	Pullman, Washington 99163

Objectives: Not provided.

Approach: Not provided.

Endocrine Mechanisms Controlling Reproduction in Horses

Investigator: V. L. Estergreen	Accession Number: 174
Start: November 1971	Location: Washington State University
Terminate: December 1973	Pullman, Washington 99163

Objectives:

Determine the levels of estrogens, progestins, luteinizing hormone, and pregnant mare serum gonadotropin in jugular vein plasma of the mare throughout the estrous cycle, pregnancy, and the post-partum period. Correlate hormone levels with particular emphasis on the period from estrus to the 80th day of gestation. Relate the changes in hormone levels to the stages of the reproductive cycles of the mare.

Approach:

Jugular blood samples will be taken by venipuncture every day during estrus and every 2nd day during the remainder of the cycle. Sampling will continue every 4th day from breeding to day 72 of gestation, on days 80, 90, 120, 150, 180, 210, 240, 270, 300, and then every 4th day through parturition to day 60 of the next gestation.

Endoparasitic Transmission of Infectious Diseases

Investigator: J. R. Gorham
Start: June 1967
Terminate: July 1972

Accession Number: 175
Location: Washington State University
Pullman, Washington 99163

Objectives:

Investigate the possible persistence and transmission of equine infectious anemia virus by endoparasites of the horse. Other hosts and viruses are also to be studied.

Approach:

Life cycles of parasites will be established under controlled conditions. This will include transmission of the parasite from definitive host through its intermediate host and back to the definitive host. Hosts will be infected with helminths and with appropriate disease agents. Adult helminths or ova will then be removed and transferred to intermediate or definitive hosts, depending on the life cycle involved. Test animals will be studied for evidence of endoparasite transmission of disease agents. Axenically grown helminths will provide disease-free experimental parasites for our transmission studies.

Pathogenesis of a Chronic Virus--Equine Infectious Anemia

Investigator: J. B. Henson
Start: January 1966
Terminate: December 1974

Accession Number: 176
Location: Washington State University
Pullman, Washington 99163

Objectives and Approach:

Delineate the chronic host-virus relationship in EIA. Attempt to clarify mechanisms of the chronic infection by studying the immune response of infected horses, the characteristics of the agent and the time and organ distribution of the agent. Various serologic techniques will be used to demonstrate the quality and magnitude of the humoral immune response directed against EIA viral antigens. The agent will be purified and then characterized by a variety of techniques. The fluorescent antibody technique will be used to visualize the agent and follow the sequential propagation in infected horses and cell cultures.

Equine Infectious Anemia--A Persistent Virus

Investigator: J. B. Henson
Start: January 1972
Terminate: December 1972

Accession Number: 177
Location: School of Veterinary Medicine
Pullman, Washington 99163

Objectives and Approach:

Equine infectious anemia is a persistent viral infection with a number of immunologically mediated lesions. Injected horses have circulating antibodies measurable by several techniques yet the blood is still infectious for horses. The research proposed here will be directed toward evaluation of the humoral and cellular immune processes and their interaction with the virus. The pathogenesis of the lesions will be investigated in detail. The virus and associated antigens will be characterized. The data obtained will be evaluated to delineate the mechanisms of viral persistence and of the pathogenesis of the lesions.

Diagnosis of Equine Infectious Anemia

Investigator: J. B. Henson	Accession Number: 178
Start: July 1967	Location: Washington State University
Terminate: June 1972	Pullman, Washington 99163

Objectives:

Conduct comparative investigations directed to the development of a diagnostic procedure for equine infectious anemia.

Approach:

The investigations will include the performance and evaluation of liver biopsy, sideroleukocytic test, serum protein determinations, complement fixation tests, hemagglutination test, precipitin test and virus isolation. The Texas, Washington, and Japanese strains of equine infectious anemia virus will be used in the investigations.

Wisconsin

Physiopathological Studies of Mammalian Respiratory Diseases

Investigator: G. E. Bisgard	Accession Number: 179
Start: July 1972	Location: University of Wisconsin
Terminate: June 1975	Madison, Wisconsin 53706

Objectives:

Study field cases of airconditioning disease and other respiratory diseases found in selected problem herds of dairy cattle, Maedi in sheep, swine influenza, infectious bovine rhinotracheitis in cattle, and influenza in the equine species. An effort will be made to find distinguishing physiopathological features of each disease investigated in the early and chronic stages of its course.

Approach:

Experimental cases of equine and swine influenza will be studied. Cases of the other diseases referred to under objectives also will be studied.

Equine Reproductive Physiology

Investigator: N.L. First
Start: January 1969
Terminate: January 1999

Accession Number: 180
Location: University of Wisconsin
Madison, Wisconsin 53706

Objectives:

Characterize the reproductive cycle of the mare. Determine the endocrine changes during the estrous cycle which control the reproductive events of the estrous cycle. Determine the relative efficiency of sperm transport in the mare at various stages of the estrous cycle. Develop methods for predicting the time of ovulation in the mare. Develop methods for synchronizing the estrous cycles of mares.

Approach:

Spermatozoa will be recovered and quantified from the vagina, uterus and oviducts at timed intervals after insemination. The anatomical size and histological changes in the oviducts, uterus, cervix and vagina will be determined as well as the size of the ovary and size and number of ovarian structures. Anterior pituitary hormones will be determined as well as progesterone content of the corpora lutea. Estrous synchronization will be attempted with a separate group of mares using compounds which prevent estrus and ovulation. If compounds and doses are found which synchronize estrus and ovulation a field trial will be conducted to determine the effectiveness of the synchronization method.

Wildlife Reservoirs of Arboviruses

Investigator: R. P. Hanson
Terminate: Indefinite 1972

Accession Number: 181
Location: University of Wisconsin
Madison, Wisconsin 53706

Objectives:

Study the ecology and significance of arbovirus infections of livestock and man in Wisconsin. Primary emphasis is placed on California encephalitis group of viruses, namely La Crosse Virus, Trivittatus Virus, Jamestown Canyon Virus and Snowshoe Hare Virus.

Approach:

A ten-year study of the natural history of arboviruses in Wisconsin based on isolation of virus and demonstration of specific antibodies in man, livestock and wild animals established that the California group of viruses were the most common of the arboviruses and that one of them induced disease and death in man. A Bunyamwera group virus and western and eastern encephalitis viruses produced disease in horses and wildlife. Primary emphasis is now placed on study of the relationship between the viruses and known vectors and on relationship between the viruses and the probable reservoir hosts: the gray squirrel, the chipmunk, cottontail rabbit and white tailed deer.

Venezuelan Equine Encephalitis Surveillance in San Patricio County, Texas

Investigator: D. O. Trainer	Accession Number: 182
Start: January 1, 1972	Location: Wisconsin State University
Terminate: June 30, 1973	Stevens Point, Wisconsin 54481

Objectives: Conduct surveillance in wild birds, mammals and reptiles at the Welder Wildlife Foundation, San Patricio County, Texas to determine the epizootiology of VEE by correlations of populations, home ranges and behavioral patterns of wildlife. The study is to: (1) Provide a sentinel system for detection of changes in VEE prevalence in San Patricio County, (2) Provide data on possible VEE on migratory waterfowl, and (3) Provide baseline data on VEE antibodies.

Wyoming

Control of Cattle Grubs in Horses in Wyoming

Investigator: J. E. Lloyd	Accession Number: 183
Start: November 1966	Location: University of Wyoming
Terminate: June 1973	Laramie, Wyoming 82070

Objectives:

Artificially infect horses with first instar larvae of Hypoderma and, using systemic insecticides, determine the possibilities of grub control in horses.

Approach:

Artificially infect horses with the first instar larvae of Hypoderma by placing the freshly hatched larvae on the skin of horses. If the grubs survive, additional horses will be purchased and infected with grubs. These infected horses will be treated with systemic insecticides to determine the effect on larvae in the horses.

Exploratory Biological Studies

Investigator: J. O. Tucker
Start: July 1968
Terminate: June 1978

Accession Number: 184
Location: University of Wyoming
Laramie, Wyoming 82070

Objectives:

Conduct short-term analyses and preliminary trials.

Approach:

Animals or specimens submitted for diagnostic examination will be examined by methods standard for Veterinary Medicine, Microbiology, and Parasitology. Special analytical or diagnostic methods will be used when necessary. Procedures for special short-term projects will be appended in detail prior to initiation of these projects. There will be emphasis on domestic animals important to Wyoming, including the horse.

Canada

Respiratory Infections of the Horse

Investigator: J. B. Derbyshire
Start: 1967
Terminate: Indefinite

Accession Number: 185
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives and Approach:

Determine the incidence and significance of viral agents causing respiratory diseases at Ontario race tracks. Isolate the protective antigens of equine rhino-pneumonitis virus in order to develop an improved vaccine.

A Pharmacological Study of Anaphylaxis in Ungulates with Particular Reference to Cardio-respiratory Functions

Investigator: P. Eyre
Start: 1968
Terminate: Indefinite

Accession Number: 186
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objective and Approach:

Elucidate the mechanisms of immediate type hypersensitivity. Characterize the antibodies and antigens. Investigate the liberation and characteristics of the putative mediators of anaphylaxis and allergy. Clarify the biochemical/immunological mechanisms. Investigate the roles of infection with bacteria or helminth parasites. Study the effects of anti-anaphylactic drugs.

Equine Metabolic Studies

Investigator: F. D. Horney
Start: 1971
Terminate: Indefinite

Accession Number: 187
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

Prepare surgical models for metabolic studies utilizing re-entrant cannulae.
Establish the intestinal protein and amino acid metabolism of the horse.

The Pathogenesis of Cerebral Nematodiasis in Horses

Investigator: P. B. Little
Start: 1972
Terminate: 1974

Accession Number: 188
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

Elucidate means by which horses affected with verminous encephalitis can be diagnosed. Determine criteria to determine the true incidence of verminous encephalitis as a cause of "Wobbles".

Strongyle Parasites of Horses

Investigator: B. M. McCraw
Start: 1970
Terminate: 1976

Accession Number: 189
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

Clarify the pathogenesis and migration pattern of species of strongyles, especially members of the genus *Strongylus*. Determine the mechanisms of exsheathment of infective larvae and the antigenic properties of exsheathing fluids and post-ecdysis metabolites. Characterize factors affecting the survival of strongyle larvae. Find the incidence of strongyles in Ontario horses.

A Radiographic-Anatomic and Clinical Study of the Equine Stifle with Reference to the Fibular Syndrome

Investigator: F. J. Milne
Start: 1970
Terminate: 1974

Accession Number: 190
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

To ascertain the cause of fibular syndrome, as seen in pacing and trotting Standardbred horses.

Cicatrization of the Soft Palate

Investigator: F. J. Milne
Start: 1972
Terminate: 1973

Accession Number: 191
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

Determine whether cicatrization is an effective means of shortening the soft palate to overcome dyspnea caused by its elongation or paralysis.

Healing of Parietal Peritoneum in the Horse

Investigator: F. J. Milne
Start: 1971
Terminate: 1973

Accession Number: 192
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

Determine how healing takes place in the parietal peritoneum.

A Radiographic Study of Bucked Shins (Periostitis metacarpi) in the Thoroughbred Race Horse

Investigator: F. J. Milne
Start: 1971
Terminate: 1975

Accession Number: 193
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objective:

Determine whether shin buck is actually a stress fracture.

The Influence of Intra-Articular Steroid Therapy on Inflammatory Arthropathy

Investigator: F. J. Milne
Start: 1971
Terminate: 1975

Accession Number: 194
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

Determine whether racing and training under intra-articular steroid therapy is deleterious to joint function.

Bone Mineralization and Maturation in the Horse

Investigator: F. J. Milne
Start: 1972
Terminate: 1974

Accession Number: 195
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

Determine the effect of calcitonin on bone formation and mineralization in young thoroughbred horses.

The Role of the Fetus in the Hormonal Regulation of
Gestation in the Horse

Investigator: J. I. Raeside
Start: 1970
Terminate: 1973

Accession Number: 196
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

Determine the involvement of the hormones of fetal testes and ovaries in the maintenance of pregnancy and determine imbalances which might lead to abortion in mares.

Infertility - an Investigation of the Causes of
Abortion in Mares

Investigator: D. Mitchell
Start: 1969
Terminate: Indefinite

Accession Number: 197
Location: Animal Disease Research Inst.
Hull, Quebec, Canada

Objectives:

Determine the incidence and causes of abortion in horses, particularly on farms where mares are kept for the production of natural estrogen.

Studies on Equine Helminths

Investigator: H. J. Smith
Start: 1967
Terminate: Indefinite

Accession Number: 198
Location: Sackville, New Brunswick,
Canada

Objectives:

Evaluate the efficacy of treatment and the role of inhibited larvae in the epidemiology of gastro-intestinal parasitism in equines.

Studies on Equine Infectious Anemia

Investigator: P. Boulanger
Start: 1969
Terminate: Indefinite

Accession Number: 199
Location: Animal Disease Research Inst.
Hull, Quebec, Canada

Objectives:

Develop methods for the propagation of EIA virus in tissue culture. Develop serological methods permitting the demonstration of the virus in infected tissues and the demonstration of antibodies in the serum of exposed, disease and immunized animals. Study the susceptibility of equines and other species of animals to the virus with special regard to distribution of the virus in the organs and to the development of antibodies in the blood serum. Study the haematology and pathology in experimentally and naturally infected animals.

Study on the Viruses of Equine Rhino-pneumonitis and
Equine Vulvitis-balānitis

Investigator: A. Girard
Start: 1969
Terminate: Indefinite

Accession Number: 200
Location: Animal Disease Research Inst.
Hull, Quebec, Canada

Objectives:

Devise convenient serological methods that permit rapid detection of the viruses in submitted field material or in tissue cultures from such material, rapid differentiation of the viruses in such preparations, detection of antibodies in sera of immunized and naturally infected horses, and characterization of equine vulvitis-balanitis virus.

Studies on Trypanosoma Equiperdum

Investigator: J.A.J. Carriere
Start: 1970
Terminate: Indefinite

Accession Number: 201
Location: Animal Disease Research Inst.
Hull, Quebec, Canada

Objectives:

Produce Trypanosoma equiperdum antiserum in the horse for complement-fixation test and adapt the techniques of Trypanosoma equiperdum antigen production and storage, with reference to propagation and storage of live trypanosomes in liquid nitrogen.

Toxicity of Lead and Zinc in Foals

Investigator: R. A. Willoughby
Start: 1971
Terminate: 1974

Accession Number: 202
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

Establish clinical, clinical chemistry and tissue analysis data on lead and zinc poisoning in foals and determine whether an interaction occurs when the two are given together.

The Kinetics of the Peripheral Blood Cells
and Plasma Proteins of the Light Horse

Investigator: V.E.O. Valli
Start: 1970
Terminate: 1973

Accession Number: 203
Location: Ontario Veterinary College
University of Guelph
Guelph, Ontario, Canada

Objectives:

Determine normal production times and peripheral blood turnover times of the light horse.

SUBJECT OF RESEARCH PROJECT

	<u>Total Funds</u>	<u>Total Scientist Man-Years</u>	<u>Total Projects</u>
ANATOMY	\$ 22,609	0.5	4
Bone 038,040			
Reproductive System 002,180			
BEHAVIOR	\$103,219	5.6	8
Anthropology 020			
Ataxia (see pathology)			
Behavior 011, 012, 034, 067,075,114,130			
Drug Detection (see Pharmacology)			
Encephalitis (see pathology)			
Lameness (see pathology)			
Neurology (see physiology)			
Sex behavior (see Reproduction--libido)			
Training 067, 130			
Wobbler (see Pathology--ataxia)			
ECONOMICS	\$ 11,281	1.0	2
Cost return analysis 079			
Marketing 078			
Market analysis 078			
ENTOMOLOGY	\$ 66,947	1.9	17
Arthropods 018, 102, 103, 113, 115, 126, 158, 160, 175, 183			
Biological control 113, 115, 126, 155, 160			
Disease transmission (see disease vectors)			
Disease vectors 016, 018,073,103,113 163, 170, 171, 175, 181			
Pest control 102, 103, 158, 161, 183			
EPIDEMIOLOGY	\$ 2,010	0.1	13
Disease incidence (see disease surveys)			
Disease surveys 058, 073, 145, 153, 159, 171, 181, 183, 184, 189			
Environment 047, 071, 098, 181			
Human diseases (See zoonoses)			
Zoonoses 145, 159, 170, 171, 181			
GENETICS			1
Cytogenetics 112			

	<u>Total Funds</u>	<u>Total Scientist Man-Years</u>	<u>Total Projects</u>
IMMUNOLOGY	\$ 41,936	1.0	16
Allergy (see hypersensitivity)			
Anaphylaxis (see hypersensitivity)			
Antibodies (see immunoglobulins) 044, 049,052,186			
Antigens 049, 073			
Autoimmunity 049			
Development of immunological competence (see ontogeny)			
Disease prevention (see vaccines)			
Disease resistance (also see physiology) 049,077			
Hypersensitivity 186			
Immunoglobulins 044, 049, 052,070,107			
Immunoparasitology 127, 189			
Interferon (see Physiology)			
Ontogeny 052			
Vaccines 007, 069, 077, 082, 162, 166, 176, 185			
INFECTIOUS DISEASES	\$909,082	15.5	55
African horse sickness (see viral diseases) 037, 108			
Arboviral diseases (see viral diseases) 007, 016, 017, 064, 145, 159, 162, 163, 170, 171,181			
Arteritis (see viral diseases) 069, 173			
Babesiasis (see parasitology-protozoology)			
Bacterial diseases 028,049			
Babesia (see parasitology - protozoology)			
Diarrhea (see Pathology - enteritis,bacterial diseases, Parasitology) 046			
Disease transmission (also see Entomology- disease vectors)			
Distemper (streptococcus) 142			
Encephalitis (see viral diseases, also see Arboviral diseases, also see Pathology - encephalopathies, also see listing for the specific disease)			
Equine Infectious Anemia (EIA) (see viral diseases) 023,026,028,041,055,073,074, 109,110,111,143,145,166,167,168,169, 173,175,176,177 178,199			
Equine Viral Abortion (EVA) (Also see viral diseases) 046, 150,185,200			
Equine rhinopneumonitis (see equine viral abortion)			

<u>Total Funds</u>	<u>Total Scientist Man-Years</u>	<u>Total Projects</u>
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INFECTIOUS DISEASES (continued)

Equine herpesvirus (see equine viral abortion)

Fungal diseases (see mycoses)

Influenza 139,145,179

Iridocyclitis (see leptospirosis)

Leptospirosis (see bacterial diseases) 049

Metritis (see bacterial diseases and Pathology)

Microbiology (see bacterial diseases, viral diseases, Parasitology)

Neonatal diseases (also see Pathology)

Neoplasms (see Pathology)

Piroplasmosis (see Parasitology - protozoology)

Pneumonia (see respiratory diseases)

Rabies (see viral diseases)

Respiratory diseases 111,145,179,185

Rhinopneumonitis (see equine viral abortion and viral diseases)

Swamp fever (see equine infectious anemia)

Transmission of (also see Entomology - disease vectors) 175,181

Vaccines (see Immunology)

Venezuelan Equine Encephalitis (VEE) (see viral diseases) 007,008,016,017,025,064,082,146,154,156,159,162,163,164,165,170,171,182

Viral diseases - 007,016,017,041,046,069,073,077,109,110,111,139,145,150,154,156,159,162,163,164,165,168,169,171,179,181,182,185

Viral encephalitis (see encephalitis)

MANAGEMENT

1

Diet (see Nutrition)

Exercise (see Physiology)

Feeding (see Nutrition)

Horseshoeing of normal feet (see Surgery for corrective horseshoeing) 080

Training (see Behavior)

	<u>Total Funds</u>	<u>Total Scientist Man-Years</u>	<u>Total Projects</u>
NUTRITION	\$457,936	8.3	19
Body composition 116			
Calcium (see minerals, feed) 063,094,117			
Deficiencies 120			
Diet 027,035,075,105,152			
Digestion (see Physiology)			
Feed (nutritive value, requirements, utilization) 035,042, 061,062,094,104, 120, 133,147			
Intestinal absorption (see Physiology)			
Metabolism (see Physiology)			
Minerals (see feed) 063,120,195			
Protein (see feed) 105,133,187			
Selenium (see feed)			
Vitamins 094,100,104,105			
PARASITOLOGY	\$346,072	6.5	17
Anthelmintics (see Prevention and Treatment) 028,043,066,071			
Biological control (see Prevention and Treatment) 127,189			
Biology of parasites 004,022,043,066,071,127			
Blood parasites (see Protozoology)			
Helminthology 004,022,043,071,184,188,189			
Immunoparasitology (see immunology)			
Prevention and treatment 022,028,043,057,066, 071,081,127,161,175,198			
Protozoology 024,076,201			
Skin diseases (see Entomology - arthropods)			
Treatment (see prevention and treatment)			
PATHOLOGY	\$327,515	7.2	39
Abortion (see reproduction and infectious diseases)			
Anemia (also see infectious diseases - equine infectious anemia) 048,060,168			
Ataxia (also see encephalopathies and neuropathies)			
Arthritis (see joint diseases)			
Blood diseases (also see anemia, Parasitology-- protozoology, Infectious diseases) 048,119,141			

<u>Total Funds</u>	<u>Total Scientist Man-Years</u>	<u>Total Projects</u>
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PATHOLOGY (continued)

Bone diseases - 045,050,120
 Cancer (see neoplasms)
 Carcinoma (see neoplasms)
 Cardiovascular diseases (Also see Infectious diseases - arteritis)
 Congenital abnormalities 045
 Deficiencies (see Nutrition)
 Diarrhea (see Enteritis)
 Encephalitis (see encephalopathies and Infectious Diseases)
 Encephalopathies (also see Infectious Diseases--viral diseases, Infectious diseases under name of specific disease)
 016,017,065,145,159,162,170,171,188
 Enteritis 046,140
 Founder (see laminitis)
 Fractures (see injuries)
 Hepatic (liver) disease
 Hereditary abnormalities (see congenital abnormalities)
 Immunopathology (see Immunology)
 Iridocyclitis (see Infectious diseases - leptospirosis)
 Injuries 045,192,193
 Joint diseases 045,086,120, 194
 Lameness 045,050,190,193
 Laminitis (founder) 035,089, 096
 Leukemia 138
 Lymphoma (see neoplasms)
 Mange (see Entomology - arthropods)
 Metabolic diseases (see physiological pathology)
 Muscular pathology, 131,132,134
 Neoplasms (tumors) 138
 Neuropathies 006, 188
 Physiological pathology 045, 060,128,131,134,140
 Pulmonary emphysema (see respiratory diseases, also see Infectious diseases)
 Radiation sickness, 148,149
 Respiratory diseases, 101, 122
 Review of literature, 144
 Sarcoid tumors (see neoplasms)
 Skin diseases (also see Infectious Diseases and Entomology - arthropods)
 Stress, 060, 067

	<u>Total Funds</u>	<u>Total Scientist Man-Years</u>	<u>Total Projects</u>
PATHOLOGY (continued)			
Trauma (see injuries)			
Tumors (see neoplasms)			
Verminous encephalitis 188			
Wobbler (see neuropathies)			
PHARMACOLOGY	\$144,624	3.3	21
Air effects on endometrium, 032			
Anesthesia, 031, 054, 135, 136, 137, 157			
Anthelmintics (see Parasitology)			
Drug detection 114			
Drug therapy (see therapy)			
Euthanasia (see anesthesia)			
Therapy (also see Infectious Diseases--antibiotics)			
029, 039, 083, 084, 085, 086, 087, 088, 089, 124, 128, 136, 186, 194			
PHYSIOLOGY	\$284,633	5.2	58
Bone 040			
Brain (see neurology)			
Blood volume (see hematology)			
Cardiovascular physiology 003, 005, 009, 015, 039, 091, 097			
124, 128, 129, 135, 137, 141, 186			
Coagulation, 099, 141			
Digestion, 027, 035, 120, 125, 133, 147			
Electrocardiology (see cardiovascular physiology)			
Electroencephalography (see neurology)			
Endocrinology (also see Reproduction) 005, 015, 068, 092, 131, 180, 194			
Enzymes, 009, 013, 093, 118, 123, 132			
Exercise, 101, 131			
Gestation (see Reproduction)			
Gonadotropins (see Reproduction)			
Growth 038, 195			
Heart (see cardiovascular physiology)			
Hematology (also see Pathology --anemia) 021, 039, 070, 093, 119, 131, 187, 203			
Interferon, 026, 041			
Intestinal absorption 027, 070, 121, 133			
Lactation 035, 070, 094			
Liver, 010, 051, 056			
Metabolism 035, 042, 060, 095, 105, 117, 120, 131, 133, 147, 187			
Milk (see lactation)			
Neurology 029, 030			
Resistance 007, 017, 026, 049, 070			
Respiration 091, 106			
Reproduction (see Reproduction)			

	<u>Total Funds</u>	<u>Total Scientist Man-Years</u>	<u>Total Projects</u>
RADIOLOGY			1
X-ray 193			
REPRODUCTION	\$ 57,432	5.0	17
Abortion, non-infectious (also see Infectious diseases) 197			
Artificial insemination 072,130			
Estrogens 036,068,090,092,130,174,197			
Follicle-stimulating hormone 036			
Gestation 130,174,196			
Gonadotropins 036,068,090,130,172,174,180			
Infertility, non-infectious (also see Infectious diseases) 001			
Libido 001,002,033,068,130			
Luteinizing hormone 174,180			
Male, 001,002,019,072,130			
Ovaries 036,068,090,180			
Ovulation control 036,090,172,180			
Parturition 130,174			
Pharmacology (see Pharmacology)			
Pregnant mare serum 014,174			
Progestagens 036,068,090,092,130,174			
Sex behavior (see libido)			
Sperm transport 180			
Sterility, physiological (see infertility)			
SURGERY	\$ 12,055	0.3	5
Anesthesia (see pharmacology)			
Corrective horseshoeing 080			
General surgery 059,091,191,192			
TOXICOLOGY	\$ 1,700	0.1	9
Mycotoxicoeses 053,151			
Poisoning 053,062,098,151,161,193,202			
Poisonous plants 153			
WASTE MANAGEMENT			1
Environmental quality 098			
<u>GRAND TOTALS</u>			
	\$2,789,051	61.5	203

Averages: \$45,349 per SMY; \$13,739 per project; 0.3 SMY per project

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Project Accession Numbers

ALABAMA:

Alabama Agricultural Experiment Station Auburn University, Auburn, Ala. 36830	002
School of Veterinary Medicine Auburn University, Auburn, Ala. 36830	001
School of Veterinary Medicine Tuskegee Institute, Alabama 36088	003

ARKANSAS:

Arkansas Agricultural Experiment Station University of Arkansas, Fayetteville, Ark. 72701	004
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ARIZONA:

Graduate School, University of Arizona Tucson, Ariz. 85721	005
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CALIFORNIA:

California Agricultural Experiment Station University of California, Berkeley, Calif. 94720	006,010
School of Veterinary Medicine University of California, Davis, Calif. 95616	007
California Institute of Technology 1201 E. California Blvd., Pasadena, Calif. 91109	009
Graduate School, University of California Box 109, San Diego, Calif. 92038	013
Hormone Research Lab, University of California 551 Parnassus Ave., San Francisco, Calif. 94122	014
Department of Biological Sciences Univ. of California, Santa Barbara, Calif. 93106	015

COLORADO:

Animal Disease Research Lab, Agri. Research Service USDA, Federal Center Bldg. 45, Denver, Colo. 80225	016,017,018
College of Veterinary Medicine & Biological Sciences Colorado State University, Ft. Collins, Colo. 80521	019

Performing Organization (cont'd)

Project Accession Numbers

DISTRICT OF COLUMBIA:

Georgetown University 021
Washington, D.C. 20007

Smithsonian Institution 020
Washington, D.C. 20560

FLORIDA:

Cedars of Lebanon Hospital 025
Miami, Florida 33125

Florida Agricultural Experiment Station 022,023,024,
Gainesville, Fla. 32601 026,027,028

GEORGIA:

College of Veterinary Medicine 029,030,031,032
University of Georgia, Athens, Ga. 30601

IDAHO:

Idaho State University, Dept. of Biology 033,034
Pocatello, Idaho 83201

ILLINOIS:

College of Veterinary Medicine 033,034,038,039,
University of Illinois, Urbana, Ill. 61801 040,041

Illinois Agricultural Experiment Station 035,036
University of Illinois, Urbana, Ill. 61801

INDIANA:

Indiana Agricultural Experiment Station 042
Purdue University, Lafayette, Ind. 47907

School of Agriculture, Purdue University 051
Lafayette, Ind. 47907

School of Veterinary Medicine 043,044,045,046,
Purdue University, Lafayette, Ind. 47907 047,048,049,050

Performing Organization (cont'd)

Project Accession Numbers

IOWA:

College of Veterinary Medicine Iowa State University, Ames, Iowa 50010	052,054
National Animal Disease Laboratory P.O. Box 70, Ames, Iowa 50010	053,055

KANSAS:

College of Veterinary Medicine Kansas State University, Manhattan, Kans. 66502	056
Kansas Agricultural Experiment Station Kansas State University, Manhattan, Kans. 66502	057,058,059,060
Theracon, Inc. Topeka, Kans. 66601	Project description not provided.

KENTUCKY:

Kentucky Agricultural Experiment Station University of Kentucky, Lexington, Ky. 40506	061,062,063,064,065, 066,067,068,069,070
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LOUISIANA:

Louisiana Agricultural Experiment Station Louisiana State University, Baton Rouge, La. 70803	071,072,073,074
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MARYLAND:

Agricultural Research Service, USDA Beltsville, Md. 20705	075,076
Maryland Agricultural Experiment Station University of Maryland, College Park, Md. 20742	078,079,080,081
U.S. Public Health Service National Institutes of Health, Bethesda, Md. 20014	077
U.S. Army Animal Assessment Division Fort Detrick, Frederick, Md. 21701	082

MICHIGAN:

College of Veterinary Medicine Michigan State University, E. Lansing, Mich. 48823	083,084,085,086,087, 088,089,091
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Performing Organization (cont'd)

	Project Accession Numbers
MICHIGAN (cont'd)	
Michigan Agricultural Experiment Station Michigan State University, E. Lansing, Mich. 48823	090,092
University of Michigan 1137 E. Catherine St., Ann Arbor, Mich. 48104	093
MINNESOTA:	
Minnesota Agricultural Experiment Station University of Minnesota, St. Paul, Minn. 55101	094,095
MISSOURI:	
University of Missouri Route 4, Columbia, Mo. 65201	098
School of Veterinary Medicine University of Missouri, Columbia, Mo. 65201	096,097,101
St. Louis University School of Medicine 221 North Grand, St. Louis, Mo. 63103	099
St. Louis University School of Medicine 1402 South Grand, St. Louis, Mo. 63104	100
MONTANA:	
Montana Agricultural Experiment Station Montana State University, Bozeman, Mont. 59715	102
NEVADA:	
University of Nevada Las Vegas, Nevada 89109	011,012
NEW JERSEY:	
New Jersey Agricultural Experiment Station Rutgers University, New Brunswick, N.J. 08903	103,104,105
NEW YORK:	
New York Agricultural Experiment Station Cornell University, Ithaca, N.Y. 14850	113,115,117
Roswell Park Memorial Institute 219 Bryant St., Buffalo, N.Y. 14222	112

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Project Accession Numbers

NEW YORK (cont'd)

State University of New York School of Medicine 3435 Main St., Buffalo, N.Y. 14214	118
State University of New York Ithaca, N.Y. 14850	116,121
State Veterinary College Cornell University, Ithaca, N.Y. 14850	109,110,111,114,120
New York University School of Medicine 550 First Ave., New York, N.Y. 10016	106
University of Rochester School of Medicine Rochester, N.Y. 14620	107
State University of New York Stony Brook, N.Y. 11790	119
Plum Island Animal Disease Laboratory Agricultural Research Service, USDA Plum Island, New York 11944	037,108

OHIO:

Ohio Agricultural Experiment Station Ohio State University, Columbus, Ohio 43210	125
Case Western Reserve University School of Medicine 2109 Adelbert Road, Cleveland, Ohio 44146	123
Ohio State University School of Veterinary Medicine Columbus, Ohio 43210	122,124

OKLAHOMA:

Oklahoma Agricultural Experiment Station Oklahoma State University, Stillwater, Okla. 74074	126
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OREGON:

Oregon Agricultural Experiment Station Oregon State University, Corvallis, Ore. 97331	127
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Project Accession Numbers

PENNSYLVANIA:

Pennsylvania Agricultural Experiment Station Pennsylvania State University University Park, Pa. 16802	133
School of Veterinary Medicine University of Pennsylvania, Philadelphia, Pa. 19104	128,129,130,131,132, 135,136,137,138,139, 140,141,142,143,144

RHODE ISLAND:

Rhode Island Agricultural Experiment Station University of Rhode Island, Kingston, R.I. 02881	145
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SOUTH DAKOTA:

South Dakota Agricultural Experiment Station South Dakota State University, Brookings, S.D. 57006	146
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TENNESSEE:

Tennessee Agricultural Experiment Station University of Tennessee, Knoxville, Tenn. 37916	147
St. Jude Children's Research Hospital 332 N. Lauderdale, Memphis, Tenn. 38101	150
Vanderbilt University Nashville, Tenn. 37203	151
University of Tennessee 1299 Bethel Valley Rd., Oak Ridge, Tenn. 37830	148,149

TEXAS:

Texas Agricultural Experiment Station Texas A & M University, College Station, Tex. 77843	152,153,162,163,166, 167,168,170,171
Texas A & M University, College of Veterinary Medicine, College Station, Tex. 77843	064,154,156,165
Baylor College of Medicine 1200 Moursund Ave., Houston, Tex. 77025	157
School of Public Health, University of Texas 6515 Freeman, Houston, Tex. 77025	159

Performing Organization (cont'd)

Project Accession Numbers

TEXAS (cont'd)

U.S. Department of Agriculture Livestock Insect Lab Agricultural Research Service, Kerrville, Tex. 78028	155
Veterinary Toxicology and Entomology Lab Agricultural Research Service, USDA College Station, Texas 77843	106,158,161

UTAH:

Utah Agricultural Experiment Station Utah State University, Logan, Utah 84321	172
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WASHINGTON:

Washington Agricultural Experiment Station Washington State University, Pullman, Wash. 99163	174,175
Washington State University College of Veterinary Medicine, Pullman, Washington 99163	173,177,178

WISCONSIN:

Wisconsin Agricultural Experiment Station University of Wisconsin, Madison, Wisc. 53706	179,180,181
Wisconsin State University Stevens Point, Wisc. 54481	182

WYOMING:

Wyoming Agricultural Experiment Station University of Wyoming, Laramie, Wyo. 82070	183,184
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CANADA:

Animal Disease Research Laboratory Canada Dept. of Agriculture, Hull, Quebec	197,199,200,201
Atlantic Area Laboratory, Animal Disease Research Institute, Canada Dept. of Agriculture, Sackville, N.B.	198
Ontario Veterinary College University of Guelph, Ontario, Canada	185,186,187,188,189, 190,191,192,193,194, 195,196

GRANTING AGENCY

Project Accession Numbers

Alabama State Agricultural Experiment Station Auburn University, Auburn, Ala. 36830	002
American Breeders Service, Madison, Wisc. 53701	019
American Quarter Horse Association Box 200, Amarillo, Tex. 79105	052,168
Arkansas State Agricultural Experiment Station University of Arkansas, Fayetteville, Ark. 72701	004
California State Agricultural Experiment Station University of California, Davis, Calif. 95616	006
Canada Department of Agriculture Animal Pathology Division, Health of Animals Branch P.O. Box 1400, Hull, Quebec	197,198,199,200, 201
Cryogenic Engineering and Mfg. Co. 4955 Bannock St., Denver, Colo. 80216	019
Florida State Agricultural Experiment Station University of Florida, Gainesville, Fla. 32601	022,023,024,026,027, 028
Fort Dodge Laboratories, Fort Dodge, Iowa 50501	166
Georgia State Agricultural Experiment Station University of Georgia, Athens, Georgia 30601	031,032
Generics Corporation of America 3 Calsar Place, Moonachie, N.J. 07074	086
Grayson Foundation, Inc. Box 364, Lexington, Ky. 40501	Description of research projects not provided. However, equine research is supported at Auburn University, Auburn, Ala.; Univ. of California, Davis, Calif.; Univ. of Kentucky, Lexington, Ky.; Michigan State Univ., E. Lansing, Mich.; and at Theracon, Inc., Topeka, Kans.
Harness Tracks of America, Inc. 333 N. Michigan Ave., Chicago, Ill. 60604	144
Idaho State University, Pocatello, Idaho 83201	033,034

Granting Agency (Cont'd)	Project Accession Numbers
Illinois Racing Board 160 N. LaSalle St., Chicago, Ill. 60601	038,039,040,041
Illinois State Agricultural Experiment Station University of Illinois, Urbana, Ill. 61801	035,036
Indiana State Agricultural Experiment Station Purdue University, Lafayette, Indiana 47907	042,043,044,045, 047,048,049,050
Iowa State University Research Foundation Ames, Iowa 50010	054
Kansas State Agricultural Experiment Station Kansas State University, Manhattan, Kans. 66504	057,058,059,060
Kentucky State Agricultural Experiment Station University of Kentucky, Lexington, Ky. 40506	061,062,063,065,066, 067,068,069,070
Louisiana State Agricultural Experiment Station Louisiana State University, Baton Rouge, La. 70803	071,072,073
Maryland State Agricultural Experiment Station University of Maryland, College Park, Md. 20742	078,079
Michigan Horse Show Association 821 S. Holly Road, Fenton, Mich. 48430	091
Michigan State Agricultural Experiment Station Michigan State University, E. Lansing, Mich. 48823	090,092
Michigan Veterinary Medical Association 1314 Waukazoo Dr., Holland, Mich. 49423	091
Minnesota State Agricultural Experiment Station University of Minnesota, St. Paul, Minn. 55101	094,095
Montana State Agricultural Experiment Station Montana State University, Bozeman, Mont. 59715	102
Morris Animal Foundation 531 Guaranty Bank Bldg., Denver, Colo. 80202	019,071,166,167,168, 169. Description of additional research projects not included for projects being supported at Colorado State Univ., Fort Collins; Univ. of California, Davis; Theracon, Inc.

Granting Agency (Cont'd)

Project Accession Numbers

New Jersey State Agricultural Experiment Station Rutgers University, New Brunswick, N.J. 08903	103,104,105
New York State Agricultural Experiment Station Cornell University, Ithaca, New York 14850	113,115,117
New York State Department of Agriculture and Markets Albany, New York 12224	109,111,120
New York State Harness Tracks, Council of c/o Saratoga Raceway, Saratoga, New York 12866	114
Ohio State Agricultural Experiment Station Ohio State University, Columbus, Ohio 43210	125
Ohio State University Hospital 410 W. 10th Avenue, Columbus, Ohio 43210	124
Ontario Ministry of Agriculture and Food Ontario, Canada	188,189,192,196
Ontario Racing Commission 1 St. Clair Avenue, Toronto 95 Ontario, Canada	186,187,188,189, 190,191,192,193, 194,195,196
Oregon State Agricultural Experiment Station Oregon State University, Corvallis, Oregon 97331	127
Parke Davis and Co. Kalamazoo, Michigan	083,084,085,088, 089
Pennsylvania Department of Agriculture Harrisburg, Pennsylvania 16802	040
Pennsylvania School of Veterinary Medicine University of Pennsylvania Philadelphia, Pa. 19104	128,129,131,132, 134,135,136,137, 141,142,143
Pennsylvania State Agricultural Experiment Station Penn State University, University Park, Pa. 16802	133
Rhode Island State Agricultural Experiment Station University of Rhode Island, Kingston, R.I. 02881	145
Smithsonian Institution Museum of History and Technology, Washington, D.C. 20560	020
Syntex Corporation, Palo Alto, Calif. 94301	087

Granting Agency (Cont'd)

Project Accession Numbers

Tennessee State Agricultural Experiment Station University of Tennessee, Knoxville, Tenn. 37916	147
Texas State Agricultural Experiment Station Texas A & M University, College Station, Tex. 77843	153,162,166,168, 170,171
Texas A & M College of Veterinary Medicine College Station, Texas 77843	156
U.S. Atomic Energy Commission, Biomedical and Environmental Research Div., Washington, D.C. 20545	148,149
U.S. Department of Agriculture, Agricultural Research Service, Washington, D.C. 20250	007,008,016,017,018, 025,037,053,055,064, 074,075,076,108,126, 146,154,155,158,160, 161,163,164,165,167, 178,182
U.S. Department of Defense, Department of the Army, The Pentagon 20310	082
U.S. Department of Health, Education, and Welfare National Institutes of Health Bethesda, Md. (Washington, D.C. 20014)	001,003,009,014,015, 021,029,030,056,077, 080,081,093,099,100, 106,107,112,116,119, 121,122,123,124,138, 150,151,154,157,159, 169,173,177
U.S. Department of Interior National Park Service, Washington, D.C. 20240	011,012
U.S. National Science Foundation Division of Biological and Medical Sciences 1800 G Street, N.W., Washington, D.C. 20550	005,010,013
U.S. Trotting Association 750 Michigan Ave., Columbus, Ohio 43215	110,130
Utah State Agricultural Experiment Station Utah State University, Logan, Utah 84321	172
Washington State Agricultural Experiment Station Washington State University, Pullman, Wash. 99163	174,175
Wisconsin State Agricultural Experiment Station University of Wisconsin, Madison, Wisc. 53706	179,180,181

Granting Agency (Cont'd)

Project Accession Numbers

World Health Organization, United Nations, FAO
Via delle Terme di Caracalla, 00100, Rome, Italy

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Wyoming State Agricultural Experiment Station
University of Wyoming, Laramie, Wyo. 82070

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A P P E N D I X

1. PURPOSES OF GRANTING AGENCIES

AGRICULTURAL RESEARCH SERVICE

Provides the knowledge and technology so farmers can produce efficiently, conserve the environment, and meet the food and fiber needs of the American people. These aims are achieved through research in all areas related to agriculture: livestock and crop production, including diseases, insects, and other pests; agricultural engineering; soil and water conservation; marketing, including quality of farm products, transportation, and facilities; consumer and food economics, including appraisals of food, diet, and family economics; human nutrition; new uses for farm products; and development of new methods for eradicating narcotic producing plants. Both basic and applied research is conducted in very close cooperation with the State agricultural experiment stations and related land-grant universities. ARS also cooperates with other research agencies in USDA, with other Federal agencies, with industry, foundations, and private groups. Research projects are also being conducted in 13 foreign countries with funds available through grants made under Public Law 480. Research projects related to the mission of the Agricultural Research Service are submitted to the Administrator of the Service at Washington, D.C.

GRAYSON FOUNDATION, INC.

The Grayson Foundation was established in 1940 with the objective of providing scientifically guided horse disease research. By working through established organizations such as colleges and universities, the Grayson Foundation has been able to use existing physical facilities in an effort to minimize the investment of Grayson funds in buildings and equipment. Its grants are intended primarily for use in funding laboratory materials and personnel.

The Grayson Foundation is exempt from Federal Income taxes under Internal Revenue Code Section 501(c)(3) as an organization operated exclusively for educational and scientific purposes.

MORRIS ANIMAL FOUNDATION

The Morris Animal Foundation was organized in 1948 for the purpose of improving the health and curing the diseases of man's companion animals: dogs, horses, cats, wildlife and zoo animals. It receives funds from individuals and organizations and administers those funds into studies relating to the health problems of animals.

The Foundation, whose office is located in Denver, Colorado, is tax exempt under Section 170(b)(1)(A)(VI) as an organization that normally receives a substantial part of its income from the general public.

Purposes of Granting Agencies (cont'd)

NATIONAL INSTITUTES OF HEALTH

The National Institutes of Health provides leadership and direction to programs designed to improve the health of the people of the United States through the following activities: (1) Conducts and supports research in the causes, diagnosis, prevention, and cure of diseases of man, in the processes of human growth and development, in the biological effects of environmental contaminants, and in related sciences, and supports the training of research personnel and construction of research facilities, and the development of other research resources; (2) Administers programs to meet health manpower requirements for the nation, primarily through the support of education and training, and to give general support to institutions engaged in education and research in the health field; (3) Directs programs for the collection, dissemination, and exchange of information in medicine and health, including the development and support of medical libraries and the training of medical librarians and other health information specialists.

NATIONAL PARK SERVICE

The public use, protection, development, interpretation, and management of the natural and cultural resources of a natural area shall be predicated on documented data obtained through appropriate investigation and research. Moreover, the use of the resources in natural areas for study or research purposes by recognized educational and scientific institutions and accredited individuals shall be encouraged. Pursuant to the achievement of these policies, the collection of reasonable numbers of biological and geological specimens and historic artifacts and objects may be permitted. All research should be in consonance with the purposes of the park and the policies of the Service. Procedures might result in damage or alteration to Class IV areas will not be permitted. Care should be taken to avoid excessive disturbance or harassment of wildlife and aquatic life. In no case will harassment of rare and endangered species be permitted, and undue disturbance thereof must be avoided.

STATE AGRICULTURAL EXPERIMENT STATIONS

Promote efficient agricultural production, marketing, utilization and distribution of farm products through approved projects and as performers of research. Conduct original and other investigations and experiments bearing directly on and contributing to the establishment and maintenance of a

permanent and effective agricultural industry in the United States, Puerto Rico, Guam, and Virgin Islands. Supported investigations have for their purpose the development and improvement of the rural home and rural life and the maximum contribution by agriculture to the welfare of the consumer, and have identifiable relationships to the varying conditions and needs of the respective States. Funds are provided by the State, Federal Hatch Act (PL-352 amended) and other public and private sources. The Federal Hatch Act funds are distributed to the Director of the respective State Agricultural Experiment Station by a formula through the Cooperative State Research Service. Project proposals are submitted to the Director of the Agricultural Experiment Station in the respective State.

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AFFECTING LIVESTOCK AND POULTRY	STUDIES OF LICE MITES TICKS AND FLEAS	158
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